WITH INSERT MAP

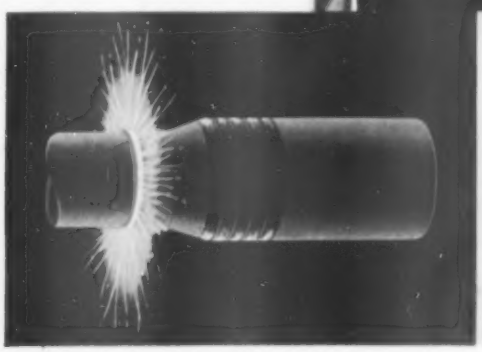
the TEXAS OIL AND GAS JOURNAL

Profit from this experience

Hughes *Flash-Weld* tool joints are veterans of the oil patch! Since 1938, more than one million HUGHES *Flash-Weld* tool joints have been used in unitizing over 32,000,000 feet of drill pipe.

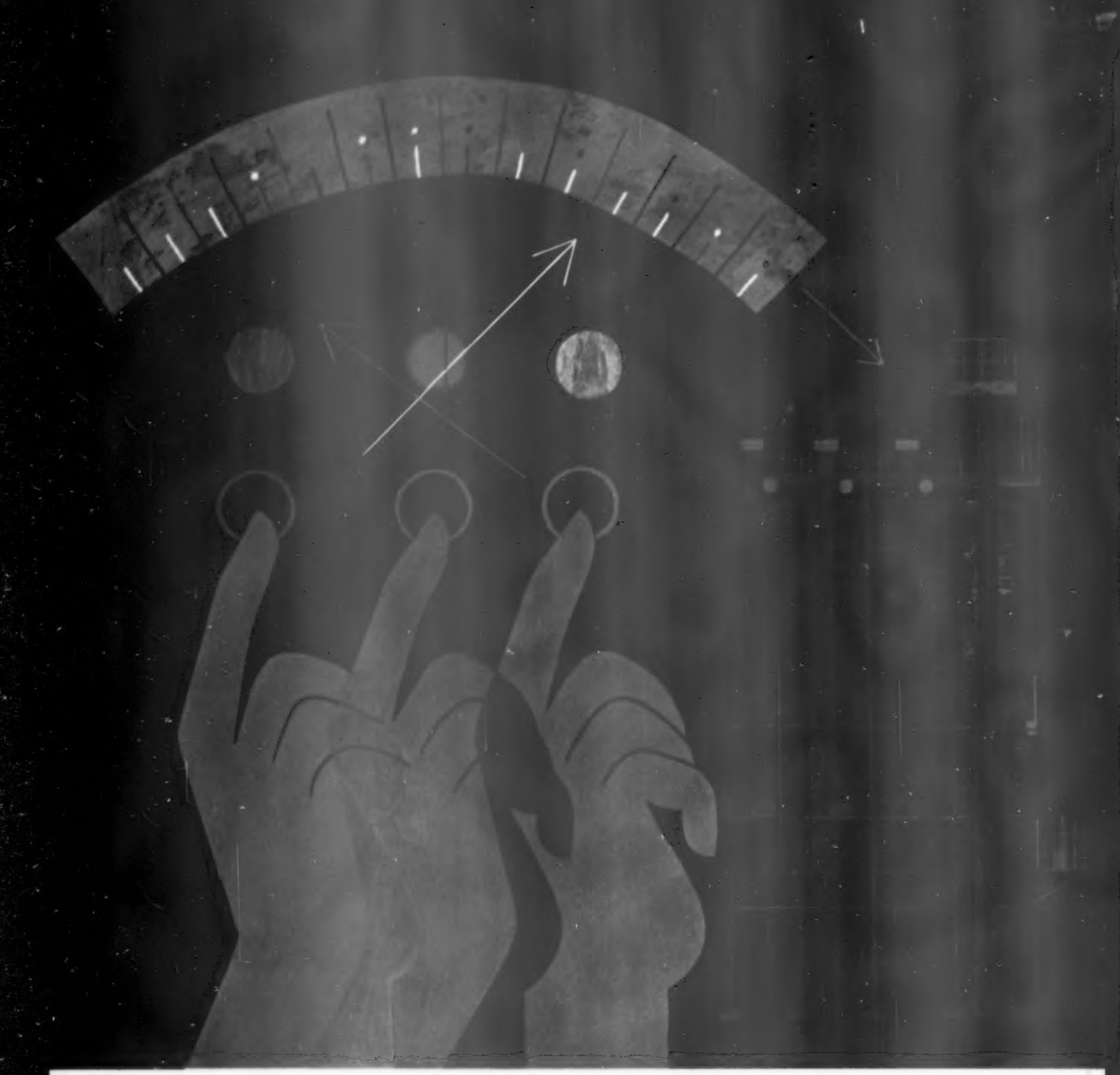
The performance records of these joints in thousands of wells prove they make the most dependable drill stem you can run in your well. And that they cost you less per foot of hole drilled!

When you specify HUGHES you get the *original Flash-Weld* tool joint... and the drilling industry's greatest flash-welding experience.



FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **MAY 24, 1954**



CEMENTING *is the control of cements*

The cybernetic age, we're told, is already here. In simplest form it means that operations are automatically controlled by electronics. One way that Halliburton uses cybernetic principles is in control of batch mixing materials at its bulk cement stations throughout the country. Cement materials for each well are specially selected to combine properties of thickening time, setting time, strength, corrosion resistance, perforating qualities, etc. Correct proportions, thoroughly blended, are of major importance—accuracy in weighing and measuring is extremely necessary—for the control of cements is what makes cementing effective. Next time you're W.O.C. remember that Halliburton, in addition to its two-million-job experience and quarter-century research, enlists the aid of cybernetics to keep cementing under control.

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL

MAY 24, 1954 VOL. 53 NO. 3

OIL IN THE NEWS . . .

Study Shows Resid Isn't to Blame for Coal's Troubles 120
Petroleum Engineers' Pay High in Industry, Survey Shows 121
Liquids Replacing Gas as Carbon-Black Feed Stock 121
Spencer Tells Compact Gas Prices Should Be Higher 122
Synthetic Rubber Up 3.7 Per Cent in 1953 Over 1952 122
Penn Grade Crude Buyers Cut Price 50 to 76 Cents 123
Magnolia Gets First Well in Federal Offshore Lands 124
Humble May Establish Louisiana's Deepest Producer 125
Phillips Wildcat Test in Alaska Completed as Dry Hole 125
Alberta Approves Issuance of Permit for Trans Canada Line 127
Amendments to Liberalize Leasing Act Prepared for Vote by Congress 128
Indiana Standard Challenges FTC's Order in "Detroit Case" 129
Bill Barring Canadian Gas Imports Hit by Administration 130
Bid Closing Nears on Sale of 25 Synthetic-Rubber Plants 130
Imports, Exports Down in March, Survey Shows 132
Problems of Small Drilling Firms Solved by Safety Alliance 134
Texas Railroad Commission Raises June Allowable 135
Standard-Vacuum Opens 17,300-Bbl. Durban Refinery 136
Saudi Arabian Decree Confirms Unusual Oil-Shipping Pact 137
Indonesia Settles Shell Property Question, Takes It Over 137
Iran Still Making Intermittent Oil Sales to Japan 138

TEXAS SECTION . . .

Texas . . . Center of Gravity of U. S. Oil—Henry D. Ralph 140
Texas Pipelines . . . Over 82,000 Miles of Them—R. G. Deering 146
Texas Eyes Offshore Prize—W. P. Sterne 152
Texas Drilling—A Study in Contrasts—Ed McGhee 155
Texas Refining and Petrochemicals—F. Lawrence Resen 158
500 Secondary-Recovery Projects Active in Texas—R. J. Enright 162
Dow Adopts Petroleum Techniques in Texas—F. Lawrence Resen 165
Here's Why Texas Is Tops in Petrochemicals—F. W. Dotterweich 170
Another Texas First, How Aerial Maps Are Made 173
Rig Hopping by Air Taxi in Texas' Permian Basin—Tom Ashley 170
Land Ownership and Mineral Rights in Texas—Bascom Giles 178
Texas' S.R.I. Helps Solve Tough Problems 180
How Texas Administers Its University Fund 182
New Texas Plant Unusual on Four Counts 184
Texas Petroleum Engineering Schools . . .
University of Texas 186
Texas A. & M. 188
University of Houston 190
Texas Tech 191
Rice Institute 193
Lamar State Tech 194
Texas A. & I. 195
Two Decades of Conservation in Texas—E. O. Thompson 197
The Basis of Texas Conservation Regulations—A. H. Barbeck 201
Texas Gas . . . Up 300 Per Cent in 10 Years—W. J. Murray, Jr. 205
T.P.R.C. Aids Operators in Secondary Recovery—Dr. G. H. Fancher 210
25,000 "Assists" Is PETEX Proud Claim 212
T.P.R.C. Report: Production by Water Drives—A. S. Trube 217
T.P.R.C. Report: Tennessee Colony Field—F. N. Speller, Jr. 371

EXPLORATION . . .

Texas Probes Its Offshore Lands 411
Texas Exploration Up 18 Per Cent 412
Report From Oil-Producing Areas 416

NEWS FEATURES . . .

They Say 107
Journally Speaking 115
Editorial 117
This Week 119
Watching Washington 129
International News 136
Refining News 279
Personals 449
Deaths in the Industry 451
Statistical Summary 452
Drilling Statistics 453
Supply Statistics 454
Refining Statistics 455
Demand Statistics 456

DEPARTMENTS . . .

Engineering Reference 263
Engineering Fundamentals 265
Modern Drilling 267
Refiner's Notebook 269
Questions on Technology 271
Pipeline Patrol—Construction 273
Drilling Contractors 283
Equipment Men in the News 387-460
Classified Advertising 457
Advertisers' Index 461

In Brief . . .

. . . we give you Texas. Or, as related by our redoubtable columnist 65 pages farther back, we have arranged for an articulate group of Texans to give you Texas, with a staff assist here and there to fill out.

Here are the salient facts about a salient oil state—its history, how it drills for oil, transports it, refines it, manufactures chemicals from it. Here is told how and where the state trains its young engineers, how its landownership and mineral rights are administered, its production regulated. Described also are the offshore operations and the secondary-recovery projects currently under way. Then there's a piece on aerial mapping, and another on rig hopping by air taxi.

There is the story of the Southwest Research Institute, the Permanent University Fund, and the account of the almost fantastic rise in the state's natural-gas industry—with its 300 per cent increase in 10 years. Here, indeed, is a story of postwar expansion unequaled. And in the 90-odd pages of the Texas Section, is a story of an oil state unequaled.

Remember - there's only

ONE TONG DIE

with this

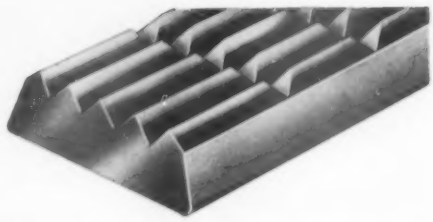
EXTRA SAFETY

and L-O-N-G RUN

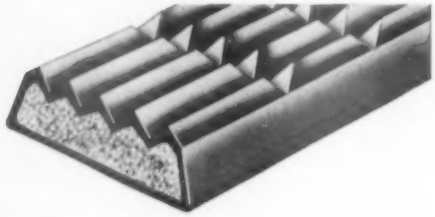
ECONOMY!

IT'S DEMCO! . . . with EXTRA SAFETY because only DEMCO Tong Dies have these patented "No Chip" soft ends!

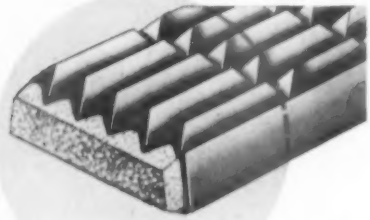
IT'S DEMCO! . . . with LONG RUN ECONOMY because the uniform full length hardness of DEMCO Tong Dies assures maximum life of the gripping surface! DEMCO Tong Dies are reversible. They require no special driving tools!



1 (above) After milling the Demco "No Chip" Tong Die is heat treated *its entire length* on all surfaces!



2 (above) The hardened case is then removed from ends exposing the tough, ductile core.



3 (above) Both ends are then beveled, allowing the core to actually extend beyond the hardened areas, providing good, absolutely chip-proof striking surfaces!

The die with the NO CHIP green ends!

DRILLING EQUIPMENT MFG. CO.
DEMCO
OKLAHOMA CITY, OKLA. U.S.A.

General Office & Plant: Oklahoma City, Okla.
P. O. Box 4728 — Phone MElrose 2-4475

Air Casualties

It's bad air that does it. But you can step up production by putting a Coppus Blower on the job to keep the air moving — and keep the men cool.

The kind of air a man works in has a lot to do with how much work he can turn out.

In confined places like shipholds or tanks or drums or boilers . . . or wherever the air is stagnant or hot or full of fumes . . . a Coppus Blower is a *must* for getting first-class work out of the men, all the time.

A Coppus Blower or Exhauster helps avoid sickness and lassitude due to bad air . . . and improves morale, too.

Portable and adaptable for special purposes, Coppus Blowers and Exhausters will have dozens of uses around your plant. The "Blue Ribbon" (a blue painted band) is your assurance of quality performance at lowest cost.

COPPUS

BLUE RIBBON BLOWERS

THE BLOWERS THAT PUT MORE MINUTES IN EVERY MAN-HOUR

CABLE MANHOLE AND TANK VENTILATORS — BOILER MANHOLE BLOWERS AND EXHAUSTERS — HEAT KILLERS — SHIPHOLD VENTILATORS . . . DESIGNED FOR YOUR INDUSTRY — ENGINEERED FOR YOU

MAIL THIS COUPON To Coppus Engineering Corp., 266 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets, etc., after treated with coating material.

NAME .....

COMPANY .....

ADDRESS .....

CITY .....

(Write here any special ventilating problem you may have.)

See "Oilwell's" NEW Drilling Control

with POSITIVE

HYDRAULIC Feed-Off

built without friction elements

The No. 10 Drilling Control

"OILWELL'S" No. 10 Automatic Drilling Control is completely new in its design, yet utilizes the same hydraulic principles which have proven so effective on No. 15 "Oilwell"-Brantly Automatic Drilling Controls for so many years—resulting in straighter hole and fewer round-trips.

This new unit is of compact construction, for use on rigs for drilling to depths of 10,000 feet.

Two speed ratios enable the driller to secure extremely accurate control of bit weights with light as well as heavy drill-string loads. This makes the automatic regulator equally effective throughout both weight ranges.

This smaller No. 10 unit, like its larger companion the No. 15, can be used with any make draw works.

GET THE COMPLETE STORY . . . on Automatic Drilling Controls from your nearest "Oilwell" representative . . . or request your copy of Booklet No. 4-54.

BRIEF SPECIFICATIONS

Showing Relative Data for No. 10 and No. 15 Units

Drilling Control Model		No. 10	No. 15
Recommended Drilling Depth	feet	To 10,000	Over 10,000
Gearing—Overall Ratio: High Speed		46.16:1	85.8:1
Low Speed		32.11:1	51.6:1
Pump: Number of Cylinders		5	6
Bore	inches	2	1¾
Stroke	inches	1⅞	2
Lubrication: Capacity of Gear Case	gallons	36	32
Dimensions: Overall Length		3'4"	8'0"
Overall Height		3'11½"	3'7"
Overall Width		2'10"	3'5½"
Weight (Complete with Automatic Regulator):			
Domestic	pounds	2,912	5,710
Export	pounds	3,212	6,490

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices—
CALGARY, CANADA
CASPER, WYOMING ..... COLUMBUS, O.
DALLAS, TEXAS ..... HOUSTON, TEXAS
TULSA, OKLA. ..... LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS

"OILWELL"

TRADE MARK

UNITED STATES STEEL

It's SMALL but MIGHTY!

The New AMERICAN T3

Features of the T3D-D10

- Designed for shallow wells.
- Manufactured to Exacting A.P.I. Specifications.
- Arc type hanger easily removed for servicing.
- Bronze bushed Saddle and Equalizer Assemblies.
- Four-legged, derrick-type Samson Post.
- Sealed bearing assemblies.
- Long Lasting Herringbone Geared Reducer.

Now . . . the American T3D-D10 completes the greatest line of pumping units made. It's the perfect answer to economical pumping of shallow, small capacity wells. Precision made, like all its big American brothers, the T3 will give you years of service for a minimum of maintenance. And, when you check its price against its quality, you'll find the American T3, the BEST BUY in the oil fields.

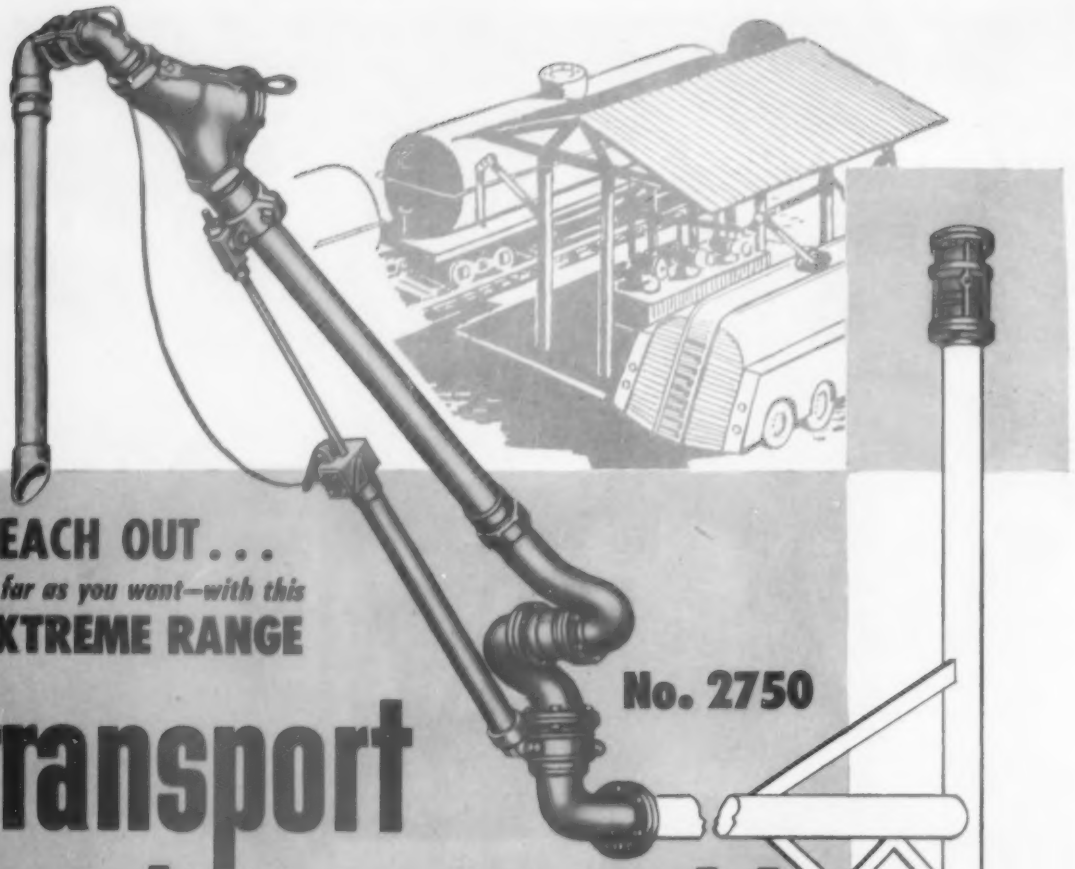
AMCOT

AMERICAN MFG. CO. OF TEXAS

P. O. BOX 7037 • FORT WORTH 11, TEXAS

Odessa • Tulsa • Kilgore • Houston • New York • Casper • Calgary, Alba.

The Oil and Gas Journal, published Mondays, copyright 1954, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U.S. and foreign rates to the petroleum industry, $4 yearly.



REACH OUT . . .

as far as you want—with this

EXTREME RANGE

No. 2750

transport loading assembly

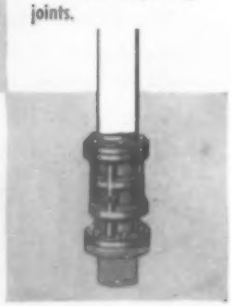
Minimum fill up time . . . no truck respotting . . . at loading racks where OPW's No. 2750 Transport Loading Assemblies are installed. The extreme range, overall compactness, and maneuverability makes the difference . . . provides a really effortless, flexible loading of tank cars and trucks.

Convenient to operate. No cumbersome counter-weights. Less mass to be started, moved, stopped. Loader controls elevation from truck by remote control cable. Arm locks in any position, elevates automatically when locking mechanism is released by operator. No valving mechanism, gaskets or piston leathers to wear. Unaffected by changes in temperature or climate.

For more details about this and other outstanding OPW Spring-Balanced and Counter-Balanced Loading Assemblies write for Catalog F-7. No obligation of course.

Sizes: 3", 4"

Riser supported by two bronze or steel straight through flanged double ball bearing swing joints.



Write for Catalog F-7, OGJ

OPW CORPORATION — HANDLING HAZARDOUS LIQUIDS — OPW — VALVES · FITTINGS · ASSEMBLIES — CINCINNATI 25, OHIO

OPW CORPORATION

2731 Colerain Ave.

Cincinnati 25, Ohio

2 New Services from Crane

How to Choose the Right Valve for Each Piping Job

HOW TO GET THESE FREE HELPS

Easiest way: phone your local Crane Representative—let him schedule a film showing for your group and supply the "take-home" handbooks. If more convenient, just drop a line to the address below.

Men responsible for specification, operation, and maintenance of industrial piping systems will get a real "refresher" from these new Crane customer services. Both film and handbook deal with the common problems of matching up valve characteristics and specific flow control needs for the most efficient result.

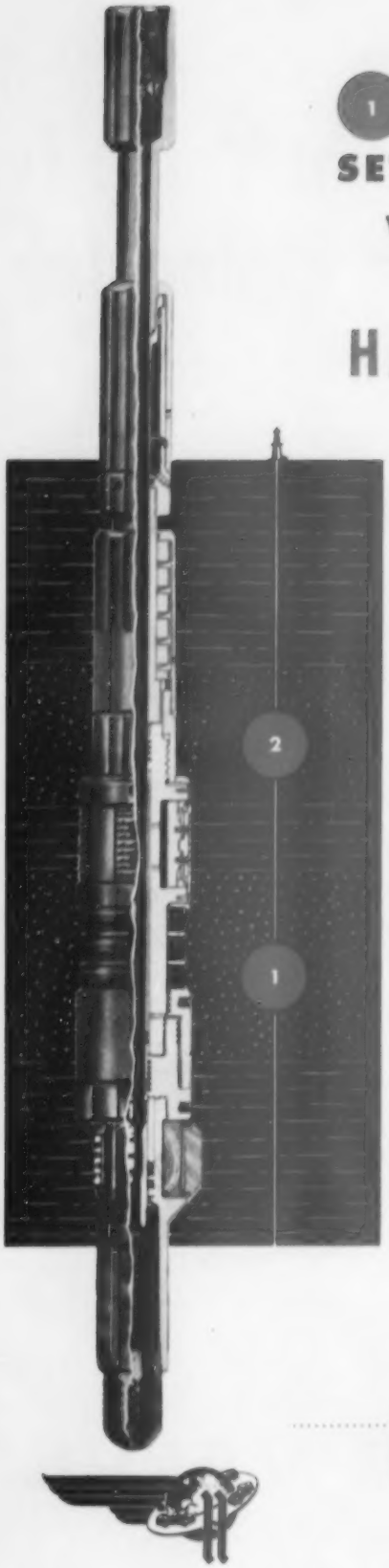
Following a review of basic valve types—gate, globe, angle, and check—variations in design of functional parts, and the effects on serviceability are discussed. All vital elements—disc and seating—disc-stem connection, bonnet joint, stem operation, etc., are covered. The motion picture stimulates high interest by developing a hypothetical case involving strong differences of opinion on valve selection. The manual—intended for distribution at film showings or for independent use—provides a lasting reference.

THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



1 2

SET, *RELEASE*, RESET without surfacing

HALLIBURTON'S *hydraulic* RETRIEVABLE CEMENTER

High speed efficiency of the Halliburton Retrievable Cementer cuts down your drilling time. The unique advantage of setting, releasing and resetting packers without *surfacing* allows fast squeeze cementing at any number of prelocated points or testing pipe at as many places as needed to locate leaks. On one quick run, this versatile tool completes the work and gets out fast!

Within one hour after cement is placed, the Retrievable Cementer is usually on the bank. And you completely eliminate any drilling out of metal. That's the high speed efficiency that means substantial rigtime savings.

Dependable hydraulic action permits fluid pressure, applied to tubing or drill pipe, to set firmly slips and packer rubbers. The hard, durable packers are compressed by a hydraulic action piston that is actuated by the same fluid pressure. Slips and packer rubbers are locked in a set position, making it unnecessary to maintain pressure on the tool.

At every step of the operation, the Hydraulic Cementer spells out big time savings. Call for a Retrievable Cementer on your next job. It comes from the world's most experienced cementers, backed by two-million-job experience. Just call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING!

Do you have this MARVEL Inverse Oiler on your { GASOLINE / BUTANE / or / DRY GAS } engine?

then you should use this MARVEL MYSTERY OIL in the Oiler!

Here's a carefully engineered pair to improve performance of any engine . . .

The *Marvel Inverse Oiler* is designed to feed *Marvel Mystery Oil* in exact proportion to engine speed and load. Prevents excess wear on valve stems and guides . . . keeps upper piston rings free to move in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakage. In addition, *Marvel Mystery Oil* reduces cylinder wall wear, and gives assurance against valves sticking. Remember, it is *the oil* which must do these things and only *Marvel Mystery Oil* is blended for this purpose and for this oiler. Over 30 years of exceptional performance.

This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	226
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	32
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	12
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	28.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

If engine load increases after setting for normal load, oiler will automatically increase its feed, or decrease its feed when load is lessened.

When more than one oiler is used

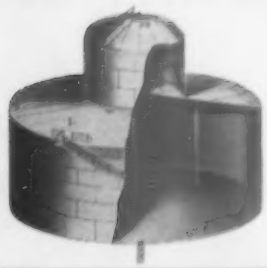
To determine drop count per oiler when more than one oiler is used on an engine—divide recommended drop count by number of oilers.

NOTE: Guarantee on oiler is void if any other oil than MARVEL MYSTERY OIL is used therein. Some *engines* also carry this guarantee policy.

See Your Local Jobber or Oil Well Supply House

EMEROL MFG. CO. Dept. 373, 242 West 69th Street, New York 23, N. Y.

the HAMMOND DIALIFT*



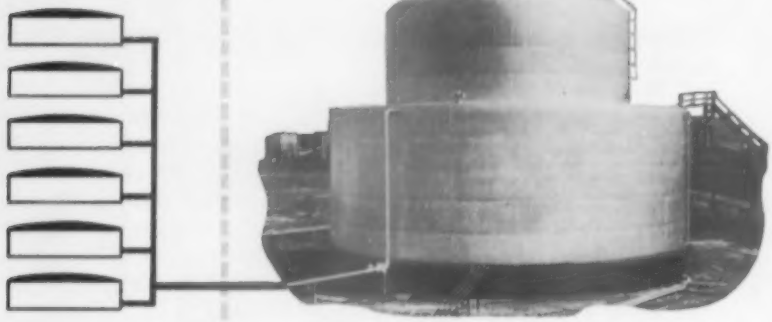
MONEY SAVER FOR PRODUCT-STORAGE OPERATORS!

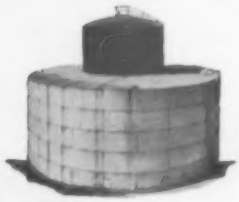
The Hammond DIALIFT is the modern tank for eliminating breathing losses and reducing filling losses. It gives maximum conservation of vapors at lowest cost.

42'6" x 40' Liquid Storage Tank 22' x 17'9" Dialift Housing — 6500 cu. ft. capacity Inter connected to a 25' x 40' Cone Roof Tank

50' x 48' Liquid Storage Tank 30' x 15'9" Dialift Housing — 12,500 cu. ft. capacity

The DIALIFT consists of a tubular membrane attached gas-tight to the inside periphery of a cylindrical housing. In operation the DIALIFT functions as the lung of the storage tank. The membrane lifts under a slight pressure when additional vapor storage space is needed, and lowers when less vapor space is required; self-adjusting to the constantly changing breathing conditions within the tank.





80' x 30' Liquid Storage Tank 35' x 17'9" Dialift Housing — 20,000 cu. ft. capacity

It is easy to convert an existing Cone Roof Tank to an efficient DIALIFT installation. A DIALIFT housing is superimposed on the existing roof, breather holes are installed through the roof plating permitting a free passage for all vapors, no other preparation is necessary.

60' x 48' Ground Type Dialift. 130,000 cu. ft. capacity

*patented

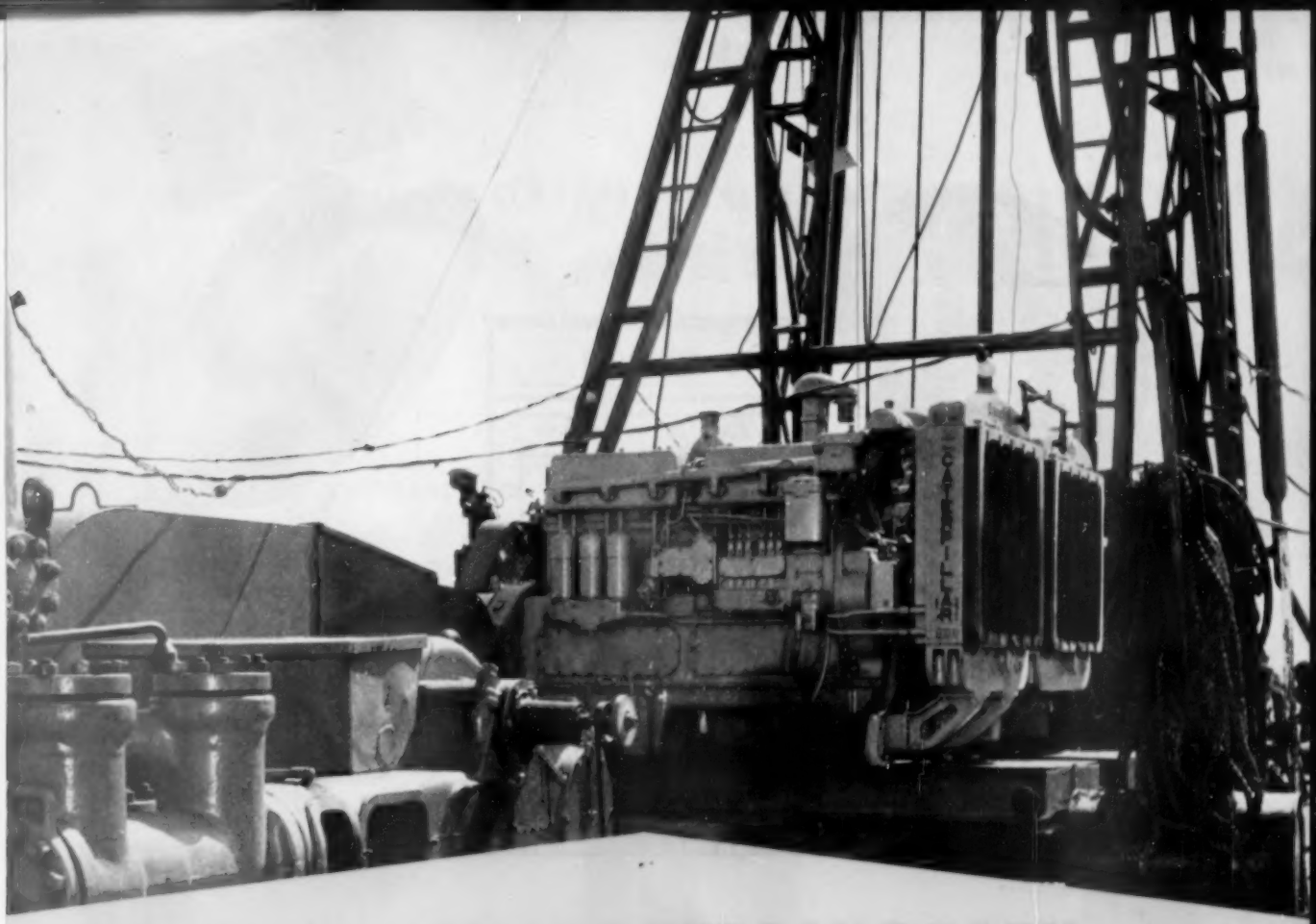
Bulletin 53DL details and describes the Hammond Dialift . . . *Write for your copy.*

HAMMOND IRON WORKS

WARREN and BRISTOL, PA. • PROVO, UTAH • CASPER, WYO. • BIRMINGHAM, ALA.

Sales Offices: NEW YORK 20 • AKRON • BOSTON 10 • BUFFALO 2 • CHICAGO 3 • CINCINNATI 2 • CLEVELAND 15 • EL PASO • HOUSTON 2 • LOS ANGELES 14 • PITTSBURGH 19 RICHMOND 20 • SAN FRANCISCO • WASHINGTON 6, D.C. • HAVANA • "TIPSA" BUENOS AIRES

ON THE PACIFIC COAST BY LACY *MFG. CO. • LOS ANGELES, CAL. • IN CANADA BY* VULCAN *IRON & ENG. LTD. • WINNIPEG*



DRILLED 112 WELLS WITH ONLY 1 OVERHAUL

Cat* Oilfield Engines battle side-by-side with you against profit-eating costs.

The experience of Pam-Kar Drilling Co., Inc., of Wichita, Kan., proves the point. In 1948, the company purchased two Caterpillar D13000s. They were compounded to drive Emsco draw works, National mud pumps and a 12-KW generator.

In 5 years, they drilled 112 wells—averaging 3500 to 4000 feet—with only one overhaul!

This is no isolated case. Economy-minded Caterpillar Oilfield Diesels stay on the job for years—8 to 15 years is common! But just as important, they stay on the job without costly repairs. And after their long, profitable service, you will find that their field reputation brings top resale and trade-in prices.

Your Caterpillar Dealer, with a solid background of oilfield experience, will show you the proper engines for your job. He has a complete power line ranging up to 500 HP and 315 KW. And after he installs your engines, he is available for quick, efficient service the clock around wherever you may be located.

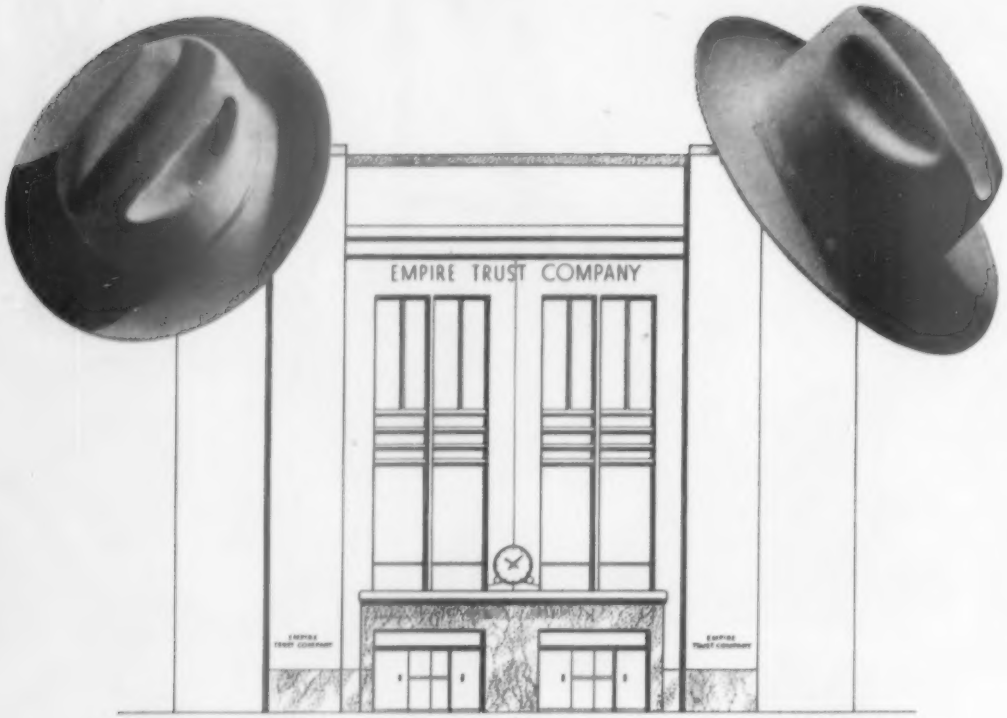
So remember, when you repower or buy new oilfield equipment, be sure to specify Caterpillar Oilfield Engines.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

SPECIFY CAT POWER FOR HIGH-PROFIT PRODUCTION



HEADQUARTERS

and a place to hang your hat...

Recognize this building? It's a familiar landmark to our oil industry friends from coast to coast. When they visit New York, you can usually find their hats hanging here.

The next time you're in Manhattan, why don't *you* pay us a call? Very possibly we can help you solve a financing or investment problem that has seemed difficult, or perhaps put you in touch with someone who has the specific knowledge or facilities to meet your needs.

Empire Trust Company

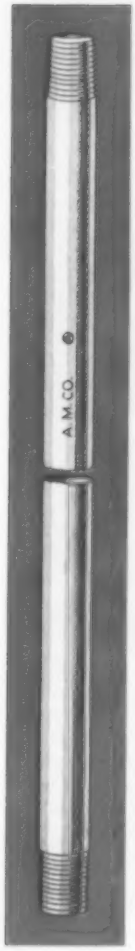
OIL AND GAS DEPARTMENT

7 West 51st Street at Rockefeller Center
New York City

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

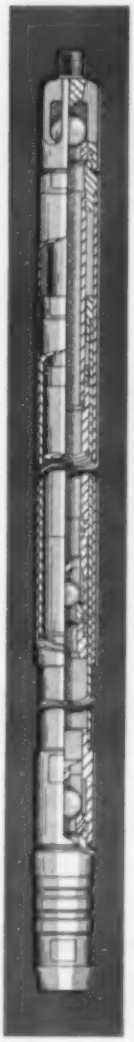
NEW

production equipment from AXELSON



NEW AXTRAHARD

a premium polished rod that withstands severe abrasive and corrosive conditions where other rods fail.



NEW TRIAX

a special three-tube pump that solves sandy well problems. Inner Tube and Outer Tube are chromium plated for extra service.

NEW DOUBLE VOLUME PUMP

provides greater production at the same cycle or same production at a lower rate.

NEW SURE-HOLD

a rugged standing valve puller, simple in design and reliable in performance. Resists rough treatment, then does the job easily when needed.

Please write for complete details

LOOK TO AXELSON FOR THE FINEST IN PETROLEUM PUMPING EQUIPMENT

AXELSON MANUFACTURING COMPANY DIVISION

LATHES: ENGINE • TOOL ROOM • HOLLOW SPINDLE • GAP BED • PETROLEUM PUMPING EQUIPMENT: DEEP WELL PLUNGER PUMPS • SUCKER RODS • HYDRAULIC PUMPING UNITS • AIRCRAFT COMPONENTS

PRESSED STEEL CAR COMPANY, INC.

RAILROAD FREIGHT CARS • STANDARD PARTS • DAIRY & FARM EQUIPMENT • WASTE CONTAINERS STAINLESS STEEL COOKWARE • CAR ACCESSORIES • TANKS • AGITATORS • SMOKE STACKS DUST COLLECTORS • COAL & ASH HOPPERS • FITTINGS & ELECTRICAL ACCESSORIES ORDNANCE MATERIEL • UNISHELTER RELOCATABLE HOMES • EXPORT ONLY: LOCOMOTIVES & TRACKWORK • CARS (MINE, ORE, CANE, INSPECTION) • UNISTRUT METAL FRAMING WEED BURNERS • BRICK & TILE MACHINERY • CANE LOADERS

PLANTS: Los Angeles 58, California; St. Louis 16, Missouri. OFFICES: New York 7, New York; Tulsa 1, Oklahoma; Buenos Aires, Argentina. DISTRIBUTORS: Jones & Laughlin Steel Corp., Supply Division; Great Northern Tool & Supply Co.; Industrial Agencies Ltd., San Fernando, Trinidad, B.W.I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; Sociedad Commercial de Materias Primas Limitado, Rio de Janeiro, Brazil; Adrian Bolland & Co., Avda. Pte R. Saenz Pena 832, Buenos Aires, Argentina; Wells Fargo & Co., Express, S.A., Apartado Postal 361, Mexico, D.F.; Dominion Oilfields Supply Co., Ltd., Calgary, Canada.; Gross Equipment S.A., Lima, Peru.

NEW Koehring 205 Truck Crane gives you lowest price per pound of lifting capacity. Its maximum 15-ton lift (on 25-ft. boom) offers a big *plus* in work capacity over other machines in the "½-yard" class. Remember, lift capacity is WORK CAPACITY. The 205's extra lift capacity increases its work capacity with all attachments. As a clamshell or dragline, it handles ½ to ¾-yard buckets on a wide work range. As a heavy-duty ½-yard shovel or hoe, its extra strength and powerful cable crowd increase production and speed of operation.

As a crawler crane, 205 has 10-ton capacity; 30 to 50-foot boom lengths. Converts to all standard excavator and crane attachments.

CHECK THESE OTHER 205 ADVANTAGES:

- 32½ m.p.h. travel speeds on rubber-tired truck mounting.
- Only 2 major shafts in upper machinery — simple, accessible.
- Big 20-inch clutches, self-adjusting.
- 4 hook-rollers, eccentric adjustment.
- Antifriction power flow for dig, lift, swing, and travel.
- On standard or extra-long crawlers, 16, 20, or 24-inch shoes.
- Automatic crawler traction-brakes.
- Independent traction optional.

K4845

Get the complete story in new 205 bulletin. Ask your Koehring distributor for your copy . . . or write us!

KOEHRING COMPANY, Milwaukee 16, Wis.

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... STATE .....

KOEHRING

Subsidiaries: PARSONS · JOHNSON · KWIK-MIX

TRANSCONTINENTAL GAS PIPE LINE CORPORATION

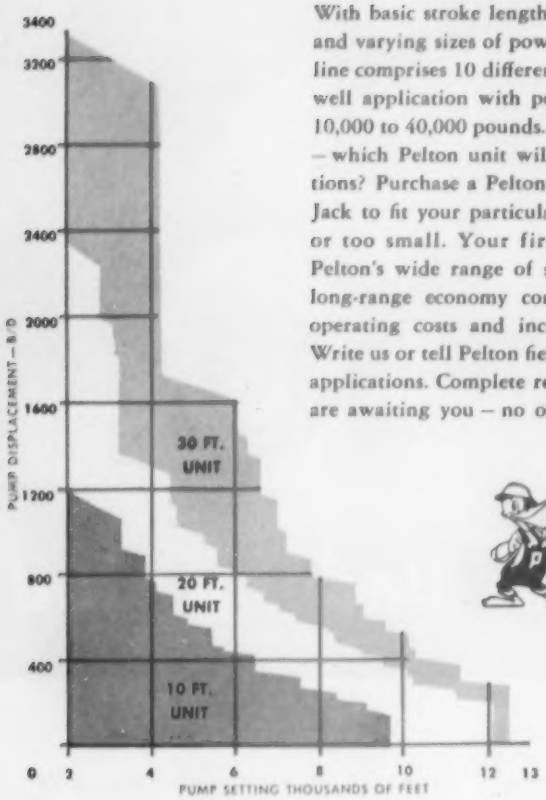
Beneath a dozen states, Transcontinental lines carry natural gas from the southernmost tip of Texas to the industrial East and the boroughs of New York. We have added a new phase to the nation's economy by serving this vast multi-state metropolitan market . . . a market we helped to create by delivering gas from the enormous Texas-Louisiana reserves to industry and homes of the eastern seaboard. We are proud of "operation underground." It is the realization of our vision of a new outlet for the Southwest's tremendous natural resources.

Engaged in making a market for Texas-Louisiana natural gas

10 PELTON MODELS OFFER YOU WIDER SELECTION – ECONOMY

HYDRAULIC LONG STROKE PUMPING JACKS

With basic stroke lengths of 10, 20 and 30 feet and varying sizes of power cylinders, the Pelton line comprises 10 different models to handle any well application with polished rod loads from 10,000 to 40,000 pounds. Try the Selection Chart – which Pelton unit will suit your well conditions? Purchase a Pelton Long Stroke Pumping Jack to fit your particular need – not too large or too small. Your first economy comes in Pelton's wide range of sizes. Your second and long-range economy comes in vastly reduced operating costs and increased oil production. Write us or tell Pelton field men about your well applications. Complete recommendations, prices are awaiting you – no obligation whatever.



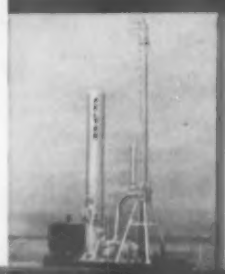
HOW TO USE THE SELECTION CHART

EXAMPLE: Well depth 8000 feet. Desired pump displacement 500 B/D. A Pelton 20-foot stroke unit will do the job. THE ABOVE SELECTION CHART BASED ON:

1. Fluid – all water
2. Fluid at pump
3. Tubing anchored
4. Limit of 40,000 PSI stress in sucker rods
5. Maximum sucker rod size 1"

PELTON is the leading manufacturer of Hydraulic Long Stroke Pumping Equipment.

Series HP 30 Ft. Stroke Jack



Series GP
20 Ft. Stroke Jack

Series FP
10 Ft.
Stroke Jack

PELTON
WATER WHEEL COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corp.
Oil Industry Machinery Division
2447 East 54th Street, Los Angeles 58, California

"Phi Beta McKee"

● It's the little gold lapel insignia McKee engineers wear. The color of the stone shows the number of years a man has been in the organization, and a good many of them show twenty-five years and more.

Sure, we do a little kidding about them—call 'em our "Phi Beta McKee's"—but we wear them with pride. That's because they really mean years of ***experience,*** and in this highly specialized business of designing and building petroleum and chemical processing plants, experience pays off.

The design, engineering or construction of a modern refinery or chemical plant is a complex undertaking requiring the coordinated effort of many kinds of technical specialists and skilled craftsmen. Here at McKee we have it down to a smooth-working system because so many of us have been working together at it for so many years.

McKee Engineering Services

Arthur G. McKee & Company • Engineers and Contractors

Headquarters: McKee Building • 2300 Chester Avenue • Cleveland 1, Ohio
Offices: New York • Tulsa, Oklahoma • Union, N. J. • Washington, D. C.
British Representatives of Metals Division: Head, Wrightson & Co., Limited
Canada: Arthur G. McKee & Company of Canada, Ltd., 350 Bay St., Toronto

- Extreme, Positive Penetration
- Larger Hole Diameter
- Scouring Effect on Well Bore
- Reduced Clean-out Time and Cost

For BETTER Results In Open Hole Shooting

Use Welex Torpedo Jets in the Improved Sectionalized Carrier

With Welex Torpedo Jets—you get POWER . . . *Plus.*

The POWER packed in Torpedo Jets guarantees deep penetration, large diameter entrance holes, and a thoroughly-scoured well bore.

The *Plus* is in the new sectionalized Torpedo Jet Carrier made of brittle CAST aluminum which disintegrates into tiny particles upon shooting. These very small particles reduce or eliminate clean-out time—and keep costs down. For maximum results in open holes . . . use Welex Torpedo Jets *every time.*

ORIGINATORS OF Welex JET PERFORATING

Welex JET SERVICES, INC.

Call Welex and be SURE!

General Offices:
1400 E. Berry Street, Fort Worth, Texas

Division Offices:
Houston · Midland · Tulsa · Oklahoma City

District Offices: Abilene · Ardmore · Beaumont · Corpus Christi · Faifurrias · Gainesville · Great Bend · Hobbs · Houston · Odessa · Pampa · Pauls Valley · San Angelo · Shawnee · Stillwater · Victoria · Wichita Falls

SPICER

Spicer developed and perfected the first practical, mass-produced universal joint for automotive use.

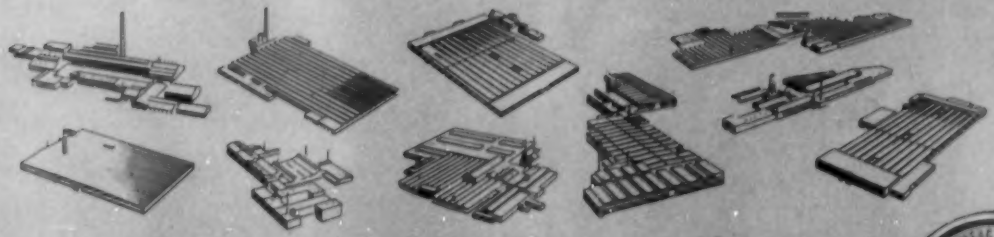
DANA

The Dana Corporation had its founding in the Spicer Corporation in 1904, and now is recognized as one of the world's leading suppliers of automotive components.

SPICER

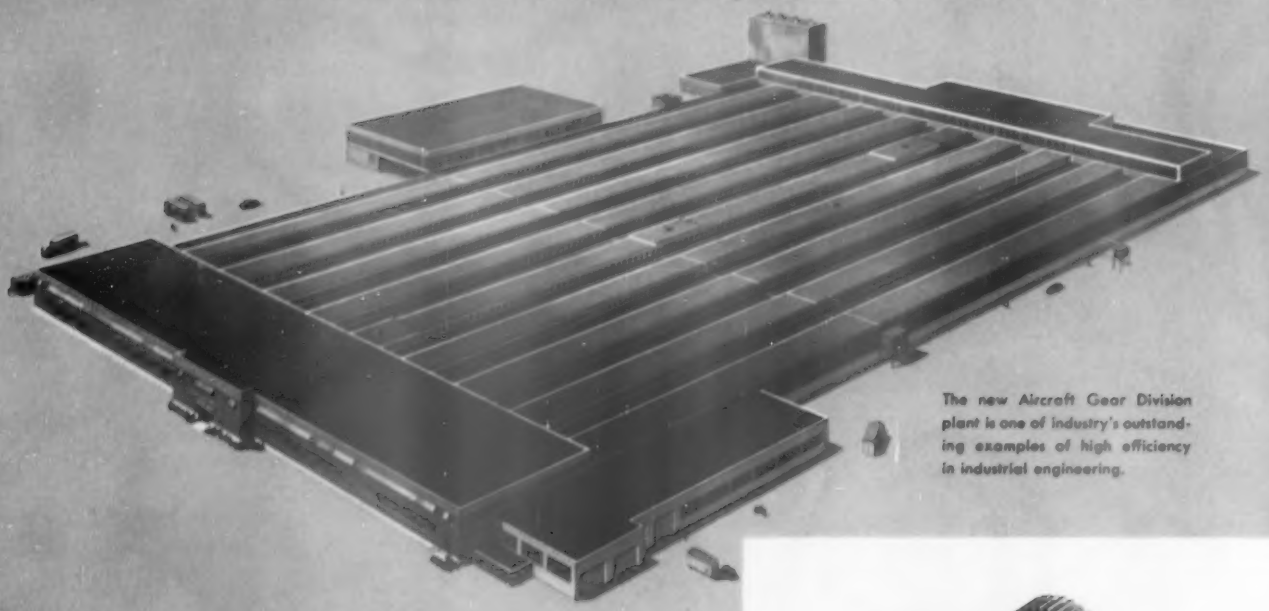
Spicer power transmission equipment in a wide variety of types is used as standard equipment on a majority of the world's automotive vehicles.

DANA



The Dana Corporation produces in its 10 modern domestic plants, and associated plants in Canada, Great Britain and France, the following products: transmissions, universal joints, propeller shafts, Brown-Lipe and Auburn clutches, forgings, axles, stampings, Spicer Brown-Lipe gear boxes, Parish frames, torque converters, power take-offs, power take-off joints, rail car drives, railway generator drives, aircraft gears, and welded tubing.

THIS IS THE AIRCRAFT GEAR DIVISION IN FORT WAYNE, INDIANA



The new Aircraft Gear Division plant is one of industry's outstanding examples of high efficiency in industrial engineering.

PRECISION GEAR PRODUCTION

complying with the most rigid military and aircraft engine producers

The Aircraft Gear Division plant was built by the Dana Corporation for the specific purpose of manufacturing gears and similar parts, and complete gearing assemblies, to the finest precision standards.

This ultra-modern plant carries into the aircraft field the Dana-Spicer tradition of ingenuity, quality and service, which has become so firmly established in the automotive industry during the past 50 years.

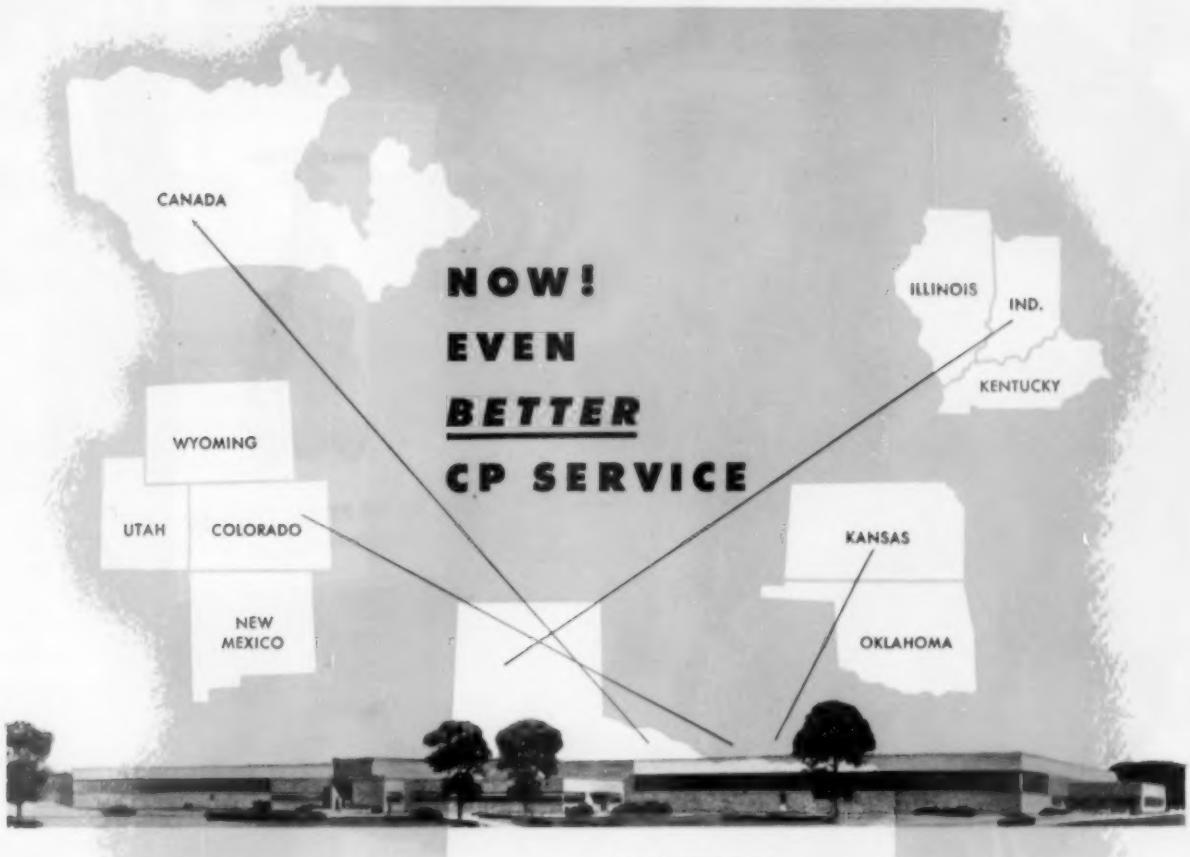
Look to Dana and Spicer for excellence in engineering . . . careful manufacturing . . . and everyday well-managed administration of service.

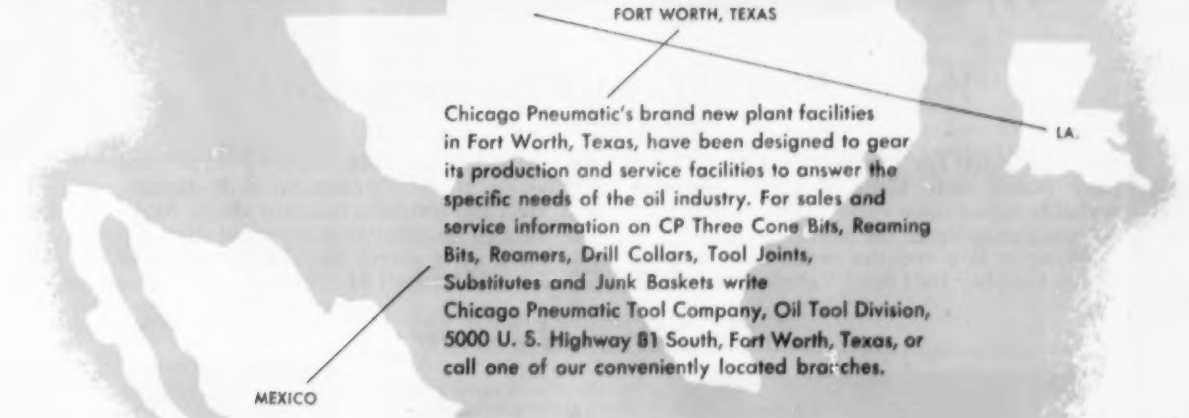
SPICER MANUFACTURING DIVISION
of Dana Corporation • Toledo 1, Ohio

50 YEARS OF Spicer SERVICE

ENGINEERING **DANA** MANUFACTURING

TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • BROWN-LIPE and AUBURN CLUTCHES • FORGINGS • AXLES • STAMPINGS • SPICER BROWN-LIPE GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • AIRCRAFT GEARS • WELDED TUBING





Chicago Pneumatic's brand new plant facilities in Fort Worth, Texas, have been designed to gear its production and service facilities to answer the specific needs of the oil industry. For sales and service information on CP Three Cone Bits, Reaming Bits, Reamers, Drill Collars, Tool Joints, Substitutes and Junk Baskets write Chicago Pneumatic Tool Company, Oil Tool Division, 5000 U. S. Highway 81 South, Fort Worth, Texas, or call one of our conveniently located branches.

Chicago Pneumatic

GENERAL OFFICES: 8 East 44th Street, New York 17, N. Y.

IN CANADA: 10103 81st Ave., So. Edmonton, Alberta, Canada

IN MEXICO: Mexico, D.R., Rosas Moreno No. 41; Tampico, Tamps., Apartado No. 174

THREE CONE BITS • REAMING BITS • REAMERS • DRILL COLLARS • TOOL JOINTS • SUBS • JUNK BASKETS

"You see POWELL VALVES everywhere!"

And no wonder! For The William Powell Company makes more kinds of valves and has probably solved more valve problems than any other organization in the world.

Wherever flow requires dependable control, there's the place for Powell Valves—famous for dependability since 1846. Made ⅛" to 30" and 125 pounds to 2500 pounds W. S. P. Bronze, iron, steel and corrosion resistant alloys. Available through distributors in principal cities. On problems, write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

CONTROLS FOR THE LIFE LINES OF INDUSTRY

Powell Valves

108th year

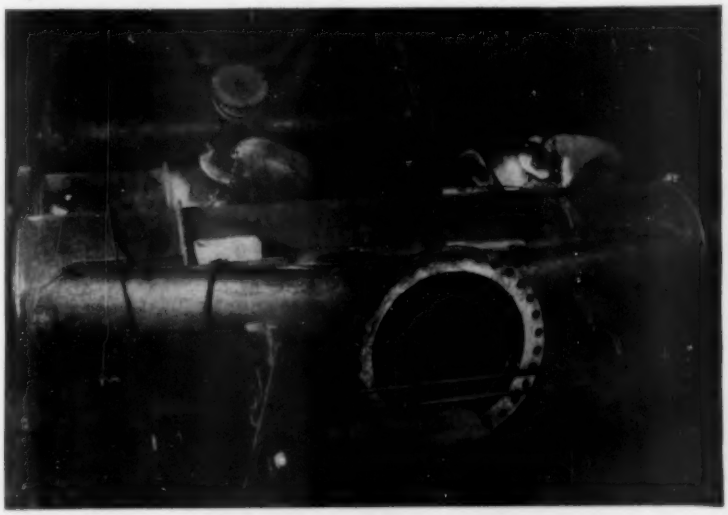
PROCESS EQUIPMENT NEWS

PUBLISHED BY FABRICATED PRODUCTS DIVISION, THE M. W. KELLOGG COMPANY APRIL-MAY 1954

3,360 Red Brass Tubes for This Condenser

Shown on one of Kellogg's boring mills (below) where the gasket face is being machined, this is a channel for one of four sections of a prefractionator condenser currently underway for a southwestern petroleum refinery.

Each bundle of the condenser will contain 840 tubes, ¾ inch in outside diameter by 16 feet in length. The water available for industrial purposes in the particular area where the condenser will be used is especially corrosive. To offset this, specifications call for red brass as the material for the tubes, this alloy having proved by experience to give the most effective protection against corrosion in the locality involved.



Tube sheets for the condenser will be of steel, clad with naval brass. Shell, shell cover, and channel are of steel. Design temperature is 200°F. on the shell side and 150°F. on the tube side.

Big Condenser Will Hold Pressure Drop to 5mm. Maximum

The drip-type condenser shown above in progress in Kellogg's shop has been designed to hold pressure drop on the shell side to the exceptionally low maximum of 5 mm. of mercury. Consisting of two sections, the unit will condense naphtha vapors and steam on the shell side and heat a petroleum distillate on the tube side. Operating pressure on the shell side will be 65 mm., and 150 psi. on the tube side.

Representative of one of the more complex types of exchanger units Kellogg is experienced in building, in addition to all the conventional types, this condenser is designed with an obround nozzle to spread the incoming vapors over the entire length of the tube bundle, thus providing for pure cross-flow heat transfer.

For further information, details of materials are supplied

FABRICATED PRODUCTS DIVISION
THE
M. W. KELLOGG
COMPANY
225 Broadway, New York 7, N. Y.
Sales offices in Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London & Paris

KELLOGG PULLMAN

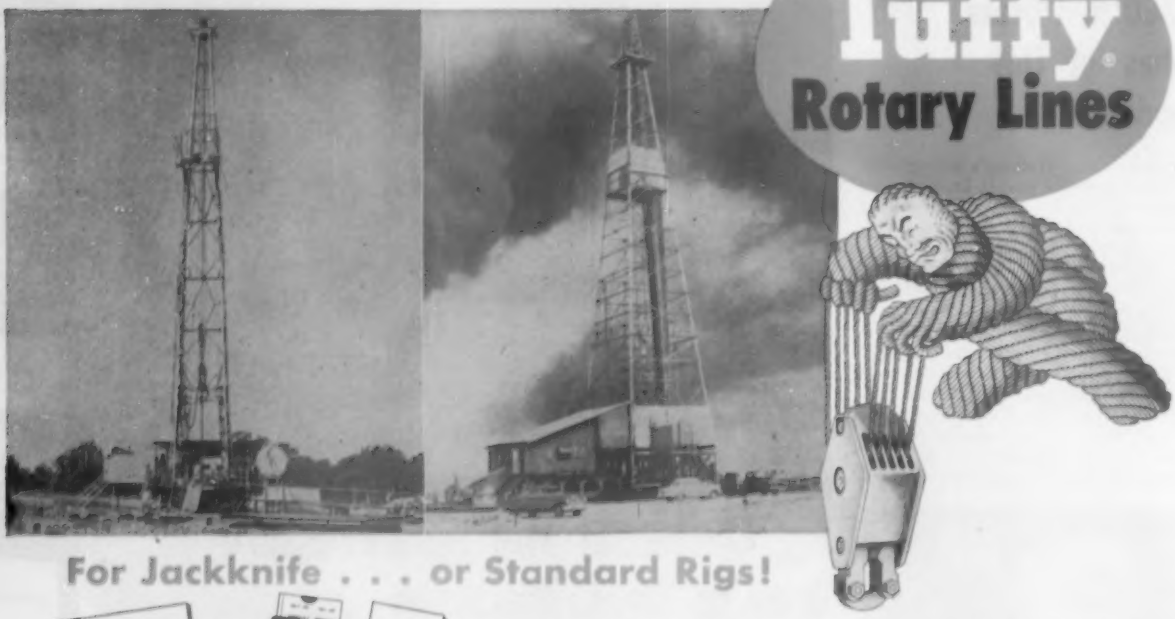
44,000-lb. Reactor for New Chemical Process

Similar in design to units refiners use in transforming certain petroleum gaseg into polymer gasoline, this big reactor (right) will shortly become an important part of a new chemical plant now building on the East Coast. The plant will be the first in this country to manufacture phenol from cumene, an intermediate material which in turn is obtained from benzene and propylene. This particular unit is the vessel in which the reaction to produce cumene will be carried out.

The tubular reactor is 3½ feet in internal diameter by 35½ feet in length, and is fabricated of high-tensile carbon steel, 1¾ inches thick. When completed, it will tip the scales at some 44,000 pounds. The unit is designed for an internal pressure of 990 psi, and temperature of 510°F.

A Great Many Tuffy ROTARY LINE Ton Miles are Extra Ton Miles

Because of Greatly Increased Service



For Jackknife . . . or Standard Rigs!

FREE **Cut-off Practice Book.** Outlines the quick, easy way to tell when to cut-off and how much. Shows how to obtain maximum service from rotary lines and avoid costly cutting too soon or too late. Carries cut-off tables for derricks of all heights operating in all major oil regions.

FREE **Ton-Mile Indicator and Log Book.** Provides you with a slide-chart method of figuring ton-miles quickly and easily, and with it you get a log book in which to record your ton-mile record.

FREE **Handbook of Wire Rope For Well Drilling & Servicing.** More than 40 pages of useful facts on wire rope for rotary, cable tool drilling and well servicing. Includes sizes and constructions of wire rope for all oil field services, its care, lubrication, abuses, correct handling, seizing and socketing.

Here is another kind of producer, contractors, toolpushers, derrick men and roughnecks all like to hit.

It's a rotary drilling line that consistently produces extra ton miles of service. Hundreds are doing it with both Tuffy Jackknife and Tuffy Standard Rotary line. Here's why and how. From the beginning Union Wire Rope engineers recognized that rotary drilling imposed different and tougher demands upon wire rope. To meet those demands they came up, out of years of research, field studies and laboratory testing, with a Tuffy Rotary Line and in its construction lies the secret of extra ton miles.

In Tuffy Rotary Lines is steel—high carbon steel specially patented for ultimate service. The number, the size of wires and lay of the rope and their pre-shaping around an independent wire rope core—all these features are special and different from any wire rope construction before used on rotary rigs.

Tuffy Jackknife Rotary Line is extra flexible for easy spooling and reeving on smaller sheaves of small jackknife rigs! Save rope costs, get extra ton miles of service, by switching to longer-lasting Tuffy Rotary Lines!

UNION WIRE ROPE CORPORATION
2102 Manchester Avenue, Kansas City 26, Missouri

At no obligation, please rush the material I have checked below:

- ☐ Cut-off Practice for Rotary Drilling Book
- ☐ Handbook of Wire Rope for Well Drilling
- ☐ Ton-Mile Indicator and Log Book
- ☐ Put my name on the list for mailings of new Rope Dope Bulletins.

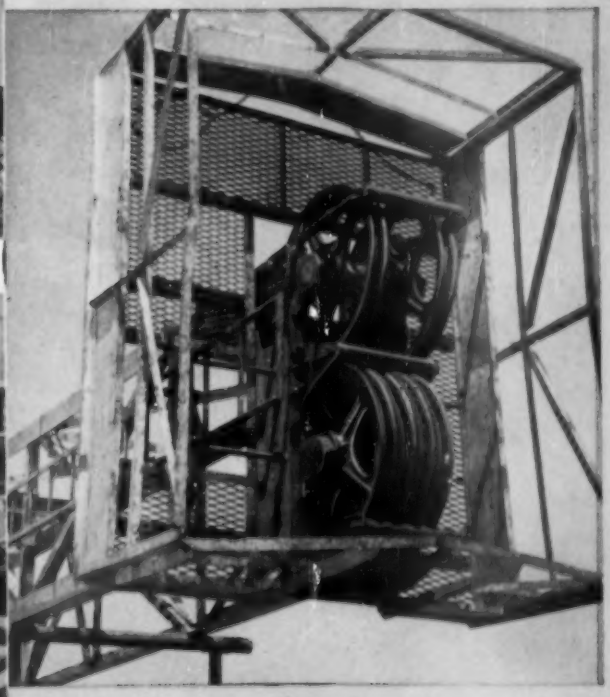
FIRM NAME_____

BY_____ TITLE_____

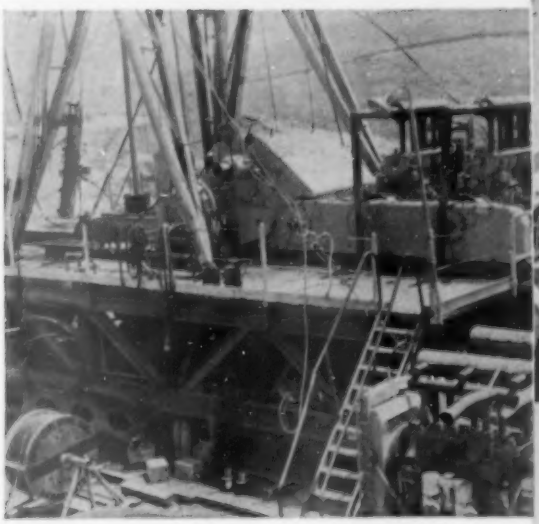
ADDRESS_____

CITY_____ ZONE____ STATE_____

Rocky, abrasive formations make for tough drilling. Today, more and more drillers are switching to Tuffy Rotary Line because it gives them greater wearability. Particularly is this true at the three areas where line wear is toughest—on the drum at cross-over points, in the middle of the line where the blocks come up light against the sudden impact of the drill pipe load, and at the dead line sheave where all the energy of vibration is absorbed.



On small jackknife rigs, the smaller diameter of the sheaves calls for an extra flexible rope. Tuffy Jackknife Rotary Line is specially constructed with the flexibility needed for best possible spooling and reeving on jackknife sheaves and drums. Add to this the built-in super strength of Tuffy Jackknife Rotary Line, and it's easy to see why users report greatly increased service life when they switch to Tuffy Jackknife Rotary Lines!



While Tuffy Jackknife Rotary Line is specially designed for use on rigs like this, Tuffy Standard should be used for deep drilling with a jackknife especially where large drill pipe with collars is handled in tribbles. It's specially constructed to resist drum crushing, vibration, shock loads and internal friction. Ask any toolpusher or rig operator who uses Tuffy Rotary Line, either Jackknife or Standard, and he'll tell you Tuffy pays off in *extra* ton mile service!

Tear Off and Mail Coupon on opposite page **TODAY**

union *Wire Rope* **corporation**

2102 Manchester Avenue • Kansas City 26, Mo.

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

It's not COMPLETE without Bovaird's

23 Offices and Stores in 5 States

PESA

OFFICES AND STORES

ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, Liberal, Pratt, Russell, Wichita
NEW MEXICO—Lovington
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Sapulpa, Seminole, Tulsa
TEXAS—Borger, Dallas, Houston, Midland, Odessa, Pampa, Snyder

TO GET WHAT YOU WANT
WHERE YOU WANT IT
WHEN YOU NEED IT...

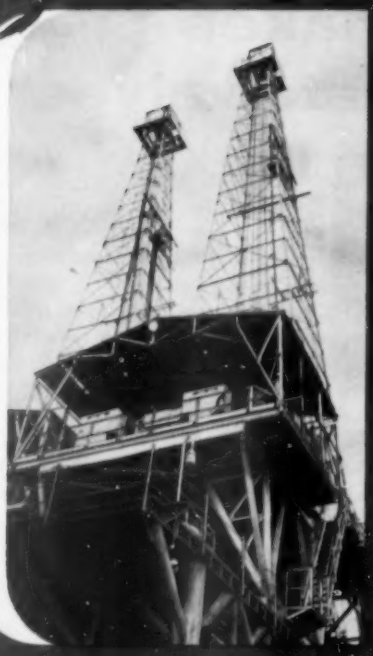
"Buy From Bovaird"

THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

83 YEARS OF PROGRESS WITH THE OIL INDUSTRY

AVONDALE *and* the OIL Industry



Partners in Progress

Pipe Jacket recently completed for the Oil Industry at Avondale's Main Yard. This Pipe Jacket is the 28th built by Avondale since 1947.

SERVICE • INTEGRITY • EFFICIENCY

SHIP BUILDING • SHIP REPAIRING • FOUNDERS • PROPELLERS • STRUCTURAL STEEL

STEEL

AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P. O. BOX 1030 • PHONE UNiversity 4561 • NEW ORLEANS 8, U. S. A.

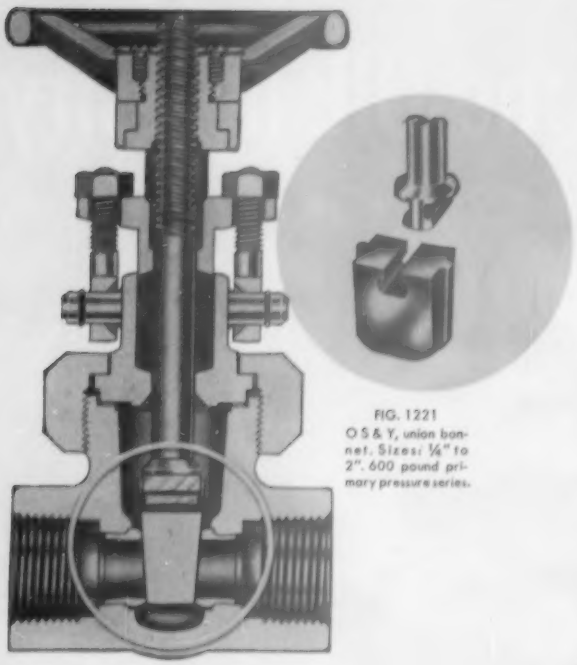


FIG. 1221
O S & Y, union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

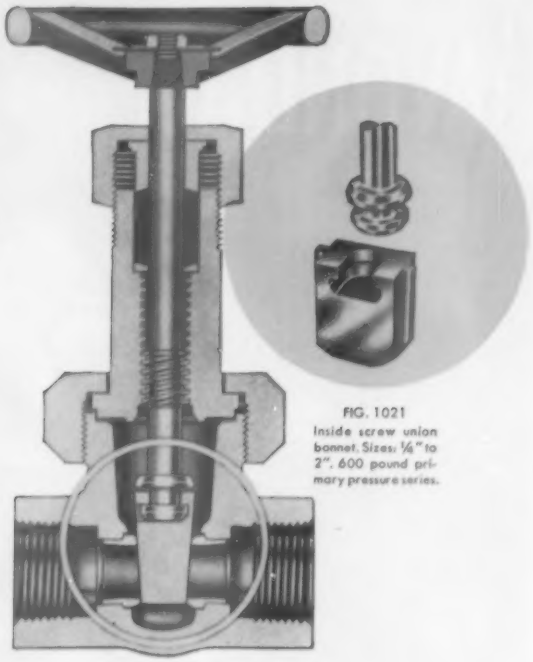


FIG. 1021
Inside screw union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

New design makes OIC forged steel gate valves the most modern line . . .

NEW: stronger stem-to-wedge connection. Improved, modern design increases pull-out strength to many times the theoretical requirement. This design distributes the pull-out load more efficiently throughout the wedge structure to meet the most stringent specifications of valve buyers in all fields.

NEW: wedges wear longer. Wedges are made of 13% chrome stainless steel for corrosion resistance. They are duracased to at least 1000 Brinell Hardness to prevent galling and excessive wear caused by frequent closures upon foreign particles in the flow.

NEW: union bonnet design is more efficient. Body-to-bonnet joint of the male-female type provides a recess for the gasket. It is contained more securely, reducing the possibility of leakage or a blown gasket.

OTHER OUTSTANDING FEATURES

Stem threads of all OIC inside screw, forged steel valves are always contained inside the bonnet. They can't possibly load up with corrosive matter which might be in the flow. This keeps the threads clean and free running, and contributes to longer stem wear.

Modern OIC Seal-Ever packing is a special composition which eliminates electrolytic action between the stem and the packing. This prevents stem corrosion in the packing area and helps maintain a leakproof seal.

Back-seating feature provides means of repacking valves while in service.

OS & Y valve gland "I" bolts are retained on trunnions by modern, more efficient, stainless steel snap rings.

Shoulder-type seat rings are expanded into the body under heavy pressure. They are accurately machined to mate tightly with the wedge for a positive seal.

Order modern OIC Forged Steel Valves from your nearby OIC Distributor. Write and request Folder No. 195.

OIC Forged Steel Valves are also available in globes, angles and checks in a variety of trims for any service.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

OIC
FOUNDED 1883
VALVES

FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON

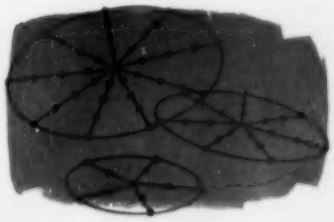
SEI

EXPERIENCE

INTERPRETATION

For twenty-two years, SEI has specialized in sub-surface studies of the domestic oil provinces . . . from Canada to the Gulf. Numerous innovations in instrumentation, interpretation, and field technique have kept SEI in the forefront. For example, in difficult areas, SEI has been a pioneer in the use of patterns of multiple shot holes and geophone arrays.

Your exploration program is in capable hands at SEI.



TECHNIQUE

SEISMIC EXPLORATIONS INCORPORATED

1007 SOUTH SHEPHERD • HOUSTON, TEXAS

Area Offices: MIDLAND, TEXAS • SHREVEPORT, LOUISIANA • OKLAHOMA CITY, OKLAHOMA • BILLINGS, MONTANA

Setting 'em down easy!

That's a trick requiring plenty of specialized experience. However, this scene at the great Shell Refinery at Houston, Texas, indicates only one facet of the Graver Construction Company.

From design to engineering, to construction and maintenance—Graver is prepared to do the whole job. Extremely flexible in approach, Graver builds not only for the petroleum industry, but for the chemical, steel and other basic industries as well.

Whether it be procurement or construction, setting machinery or plant maintenance, it will pay you to consider Graver—an old name in the petroleum industry . . . a respected name throughout industry.

GRAVER CONSTRUCTION CO.

332 S. Michigan Avenue, Chicago 4, Illinois

New York • Houston

a division of

GRAVER TANK & MFG. CO., INC.

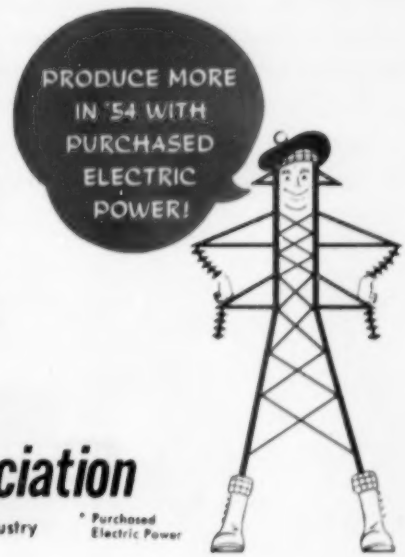
NATIONAL CONSTRUCTORS ASSOCIATION

GRAVER . . . *equipped to handle the entire job.*

To secondary recovery operations, Purchased Electric Power brings dependable, 24-hour-a-day power at *lowest possible cost* . . . . just another instance which shows how PEP* is benefiting the Petroleum Industry.

Yes, PEP* works day and night — or operates on any fractional time schedule . . . . which means you pay only for power used. Upkeep and maintenance costs are lower, too . . . . which means that manpower and payroll costs are also cut to the bone.

Let Purchased Electric Power go to work for *you!* There's a Power Engineer at your nearest Electric Power Company who can give you the answers to all your power problems. Why not get in touch with him today?

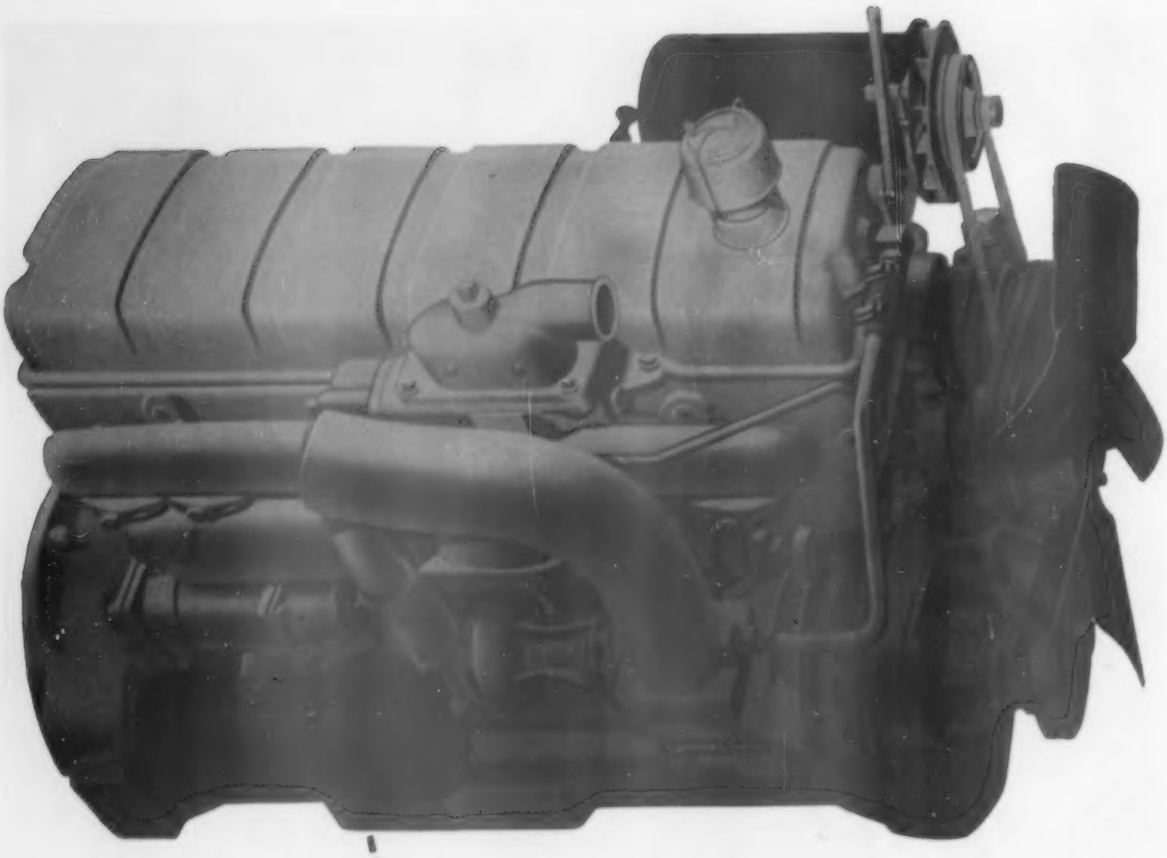


CALL YOUR NEAREST ELECTRIC SERVICE COMPANY **for more facts, or address your request to P. O. Box 2771, Dallas, Texas**

Petroleum Electric Power association

ORGANIZED in the interest of greater service to the petroleum industry

* Purchased Electric Power



150 h.p. JBS 600 gives Cummins Diesel economy

CUMMINS **Cummins**

Engine Company, Inc. • Columbus, Indiana

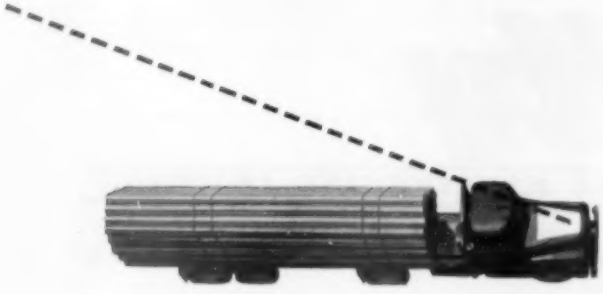
Cummins newest diesel cuts fuel costs as much as 33%

and performance to medium heavy trucks!

This diesel is engineered especially for medium heavy-duty truck service. It features rugged 4-cycle design for long life and minimum maintenance costs.

It embodies all the features of the exclusive Cummins system of fuel metering and injection; is simple and easy to maintain. This system has made Cummins Diesels famous for greater efficiency under all operating and load conditions. Every gallon of fuel produces more mileage and the JBS-600 gives top performance on less expensive diesel fuel. *(No. 2)*

The Cummins JBS-600 Diesel is offered as standard or optional equipment by the leading truck and bus manufacturers. Their local representative or the Cummins dealer in your area will give you specifications.



Leader in rugged, lightweight, high-speed diesel engines [60-600 h.p.]

29 YEARS...

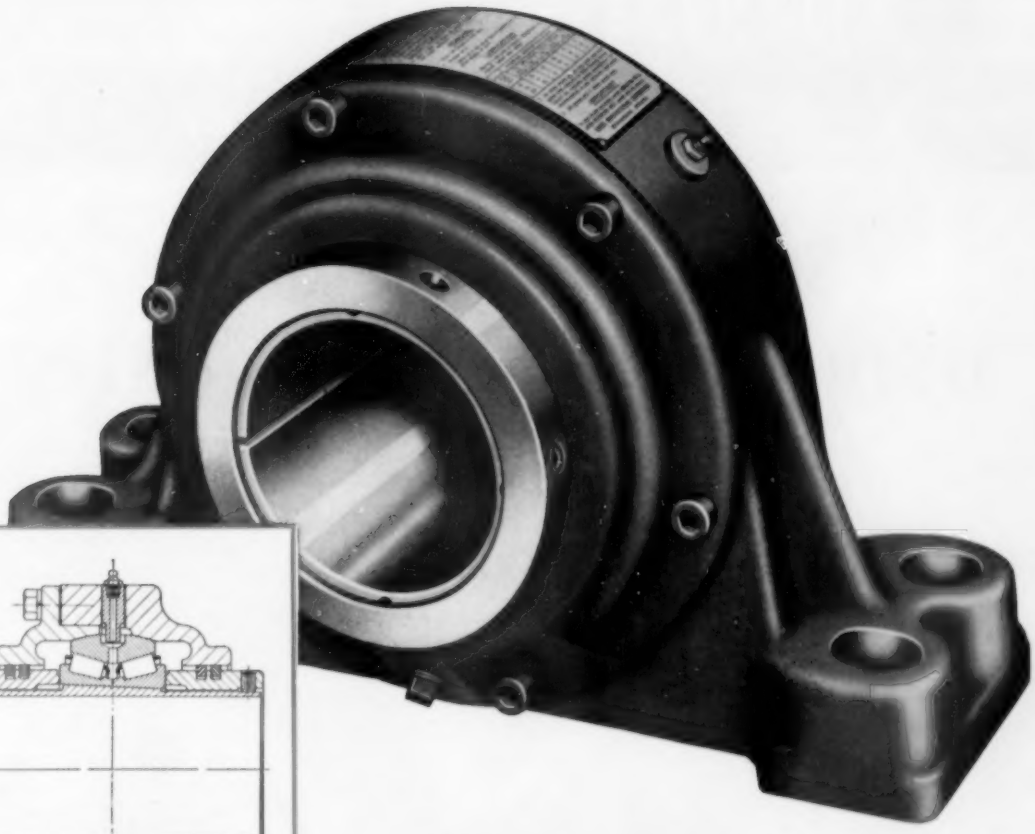
of world-wide
Geophysical Experience
go into
every job
we undertake

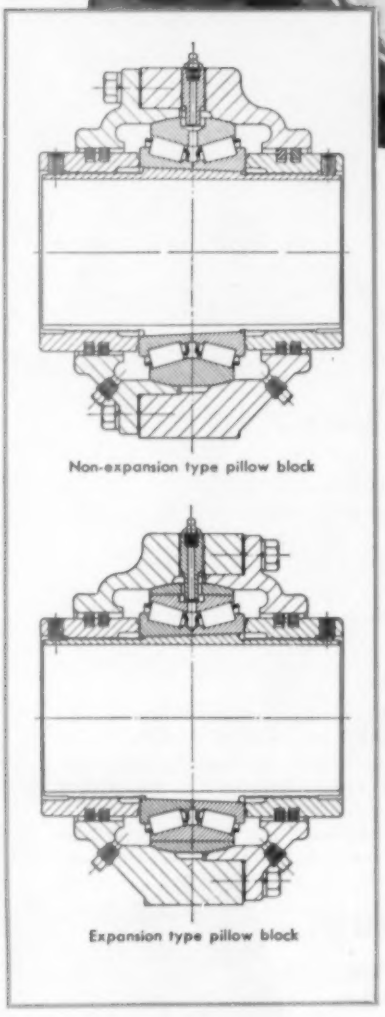
Petty

GEOPHYSICAL ENGINEERING COMPANY

SAN ANTONIO, TEXAS

SEISMIC • GRAVITY • MAGNETIC SURVEYS





How the new Dodge-Timken All-Steel pillow block gives you more load capacity in less space

HERE'S the new "All-Steel" pillow block that's making an outstanding record in heavy-duty applications. It takes up less space. It weighs less. Yet this Dodge-Timken All-Steel pillow block has tremendous load-carrying capacity. It is available in both expansion and non-expansion design. And it incorporates all the advantages of Timken® tapered roller bearings.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings greater load-carrying capacity. And the Timken bearing in this pillow block is of new design, with tapered bore and self-aligning spherical outer race.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the machinery with which the pillow block is used.

Timken bearings make any machine better. Always look for the trade-mark "Timken" on the bearings in the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION

For 15 Years... Reducing Oil Well Pumping Costs

16

VICKERS® *Long Stroke*

HYDRAULIC PUMPING UNITS

Since the first installation in 1937, Vickers Hydraulic Pumping Units have been cutting the cost of lifting crude oil. Cost reduction is accomplished by marked improvement in subsurface efficiency, reduced well maintenance, practical elimination of rod breakage and, where desirable, a substantial increase in production.

(This original unit is still operating efficiently 24 hours per day after 16 years on the same well.)

Unitized design eliminates costly foundations and makes it unnecessary to disconnect any hydraulic piping to service the well. Among the other Vickers advantages are:

- *20 and 30 ft. stroke with maximum polished rod speed at minimum strokes per minute. (7 and 6 s.p.m. respectively)*
- *fewer reversals*
- *lower range of rod stress*
- *smooth shockless reversals*
- *lower standing valve velocities*
- *more safety features*
- *lower power requirement*
- *easier to operate*

Vickers Hydraulic Pumping Units were the first to feature unitized construction, long stroke, and pneumatic counterbalance. Vickers Units operate day in and day out, year after year with minimum maintenance.

Using standard hydraulic oil as the working fluid, they are self-lubricated and totally enclosed . . . have automatic overload protection.

VICKERS Incorporated

Division of the Sperry Corporation

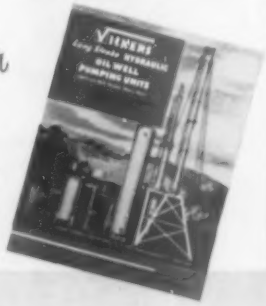
Petroleum Equipment Department

2160 EAST IMPERIAL HIGHWAY • EL SEGUNDO, CALIF.

Offices: 900 E. Second St., Odessa, Texas • 317 Thompson Bldg., Tulsa, Okla.

Engineers and Builders of Oil Hydraulic Equipment Since 1921

Write for New Bulletin No. 53-51.



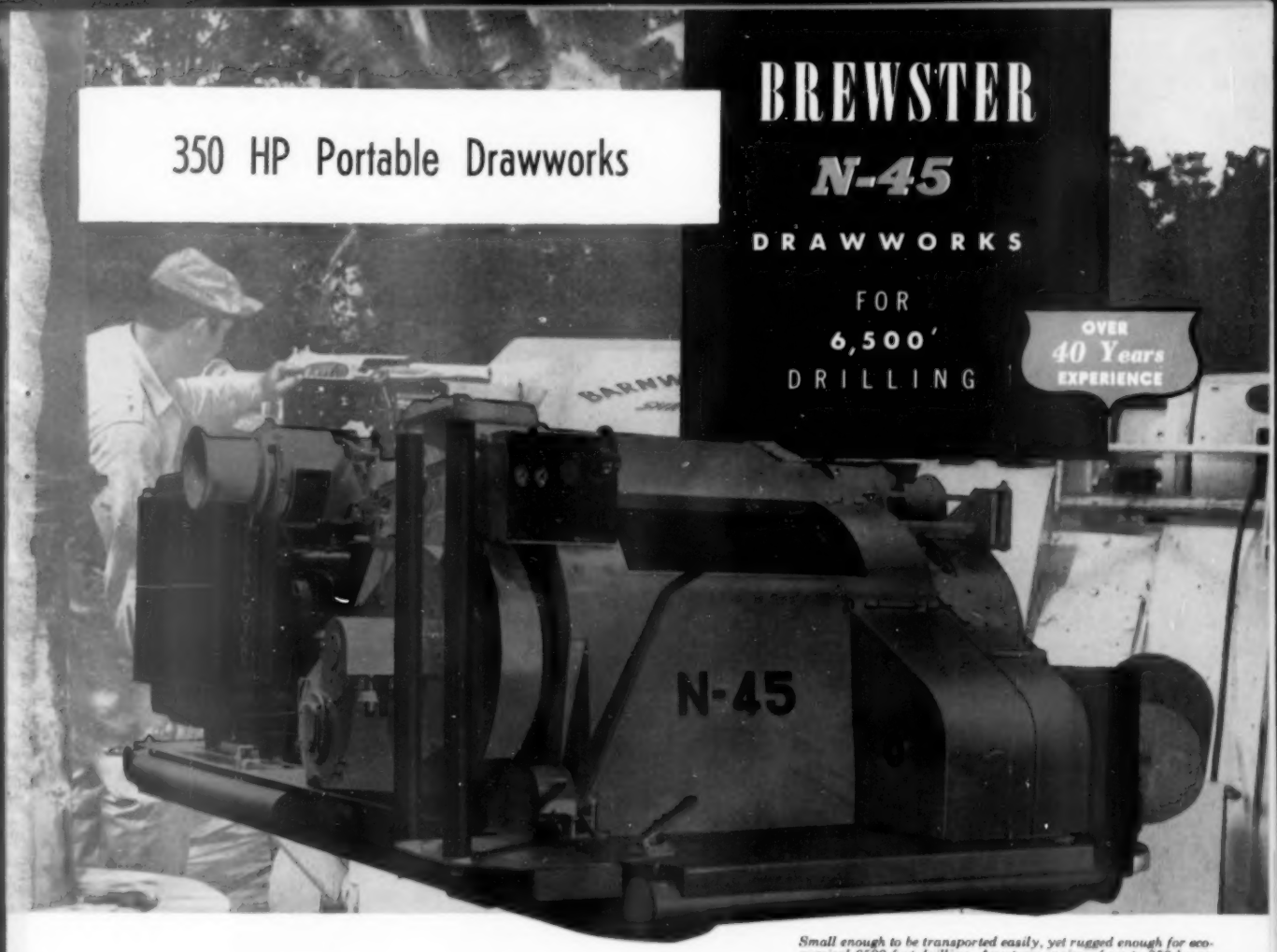
6041A

350 HP Portable Drawworks

BREWSTER N-45 DRAWWORKS

FOR 6,500' DRILLING

OVER 40 Years EXPERIENCE



Small enough to be transported easily, yet rugged enough for economical 6500-foot drilling. Any type engine of up to 350 horsepower may be used by simply selecting proper engine sprocket.

The compact N-45 torque converter drawworks, patterned after the proven design of other Brewster-engineered equipment, meets the need for a flexible rig suitable for 6500-foot drilling or deep well workovers. Brewster's experience and skill in manufacturing fine rotary drilling equipment have been combined to produce a rig that will keep down-time and drilling costs at the minimum. The N-45 is only eight feet wide to meet all highway transportation regulations.

Controls—All controls air operated and conveniently located at driller's position in a central control panel.

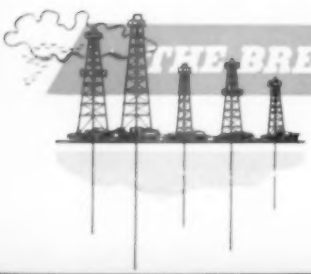
Drum—Drum core, 18 inches in diameter by 40 inches in length, built for long wire line life. Drum shaft 6 inches in diameter for extra strength.

Transmission—Chain type transmission has two forward speeds obtained by friction clutches and a reverse speed. Driller can shift from high to low without stopping load.

Brakes—Water cooled, full wrap, self-energizing brake is compounded for easy holding of heavy loads. Auxiliary 15 inch Double Hydromatic brake is built into drawworks housing.

Chains—Transmission and drum drive chains 1¾-inch pitch double high speed roller type in oil bath. Rotary drive countershaft has 1¾-inch pitch single chain. Hydromatic brake driven by 1¾-inch pitch triple chain from drum shaft with disconnecting clutch on drum shaft to eliminate chain running except when brake in use.

Clutches—All clutches air operated. Drum has auxiliary positive clutch for safety in case friction clutch fails.



THE BREWSTER COMPANY, INC. SHREVEPORT, LOUISIANA

BREWSTER DRILLING EQUIPMENT

ASK YOUR SUPPLY HOUSE TO TELL YOU ABOUT THE NEW N-45 DRAWWORKS

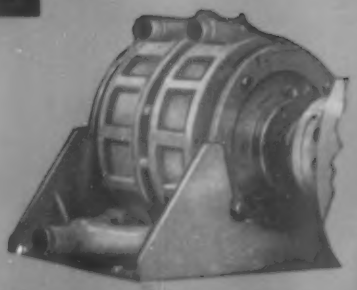
SUPPLY HOUSES - *Apex Equipment Company • Murray Brooks, Inc. • Reams Supply Company • Bovaird Supply Company • Industrial Supply Company • In Canada: Rocky Mountain Supply Company – Direct and through recognized export dealers.*

Simple, Responsive **CONTROLS**

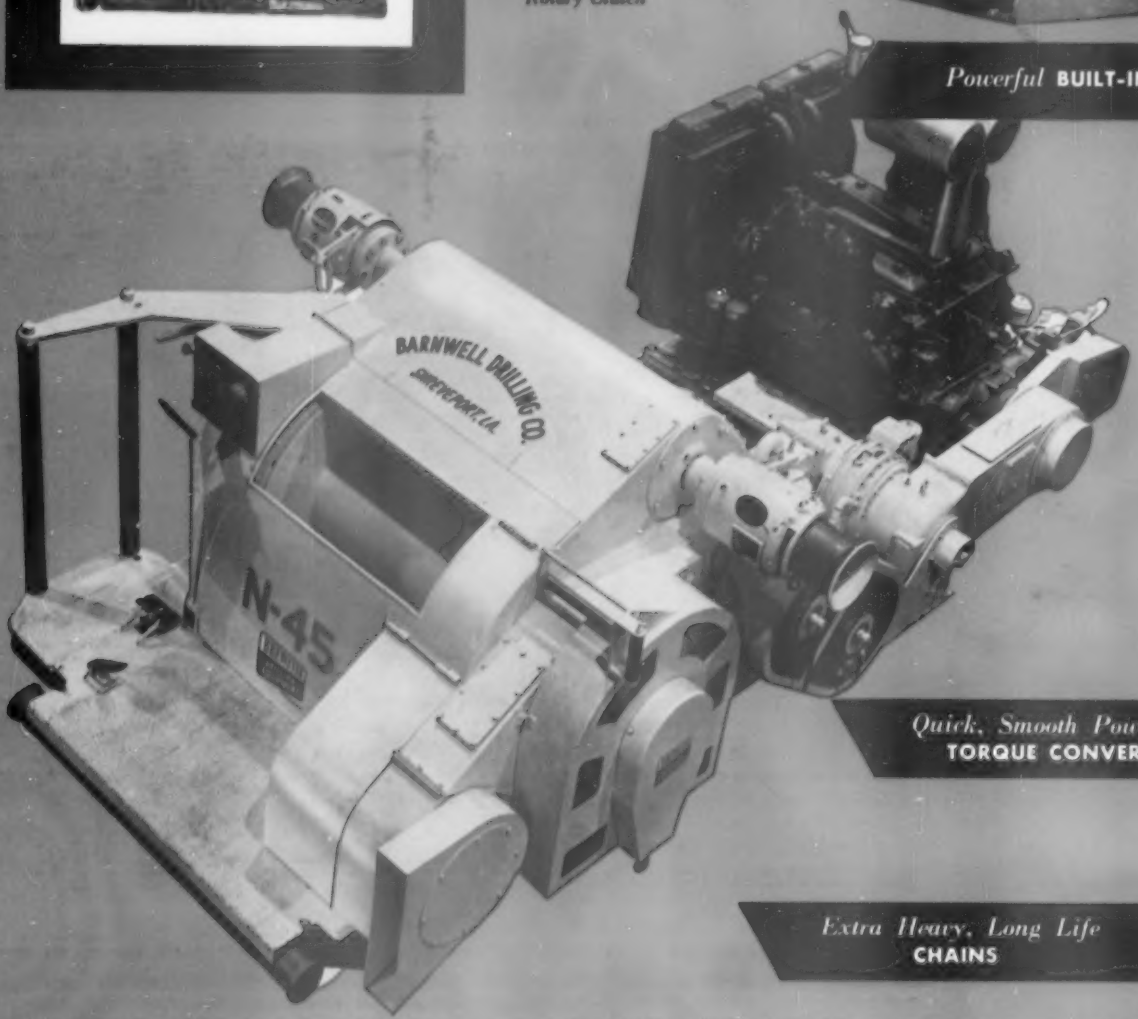
Transmission Brake
Torque Temperature
Torque Oil Pressure
Breakout Cathead

Air Gauge
Oil Gauge
Motor Throttle

Drum Clutch
High-Low Transmission Clutch
Rotary Clutch



Powerful **BUILT-IN BRAKE**

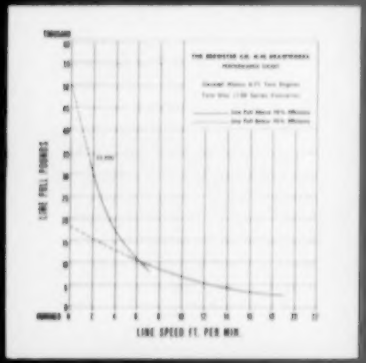


Quick, Smooth Power With
TORQUE CONVERTER

Extra Heavy, Long Life
CHAINS

BREWSTER RIGS ARE DEPENDABLE—RUGGEDLY BUILT—EASY TO OPERATE—EASY TO SERVICE

PERFORMANCE CHART



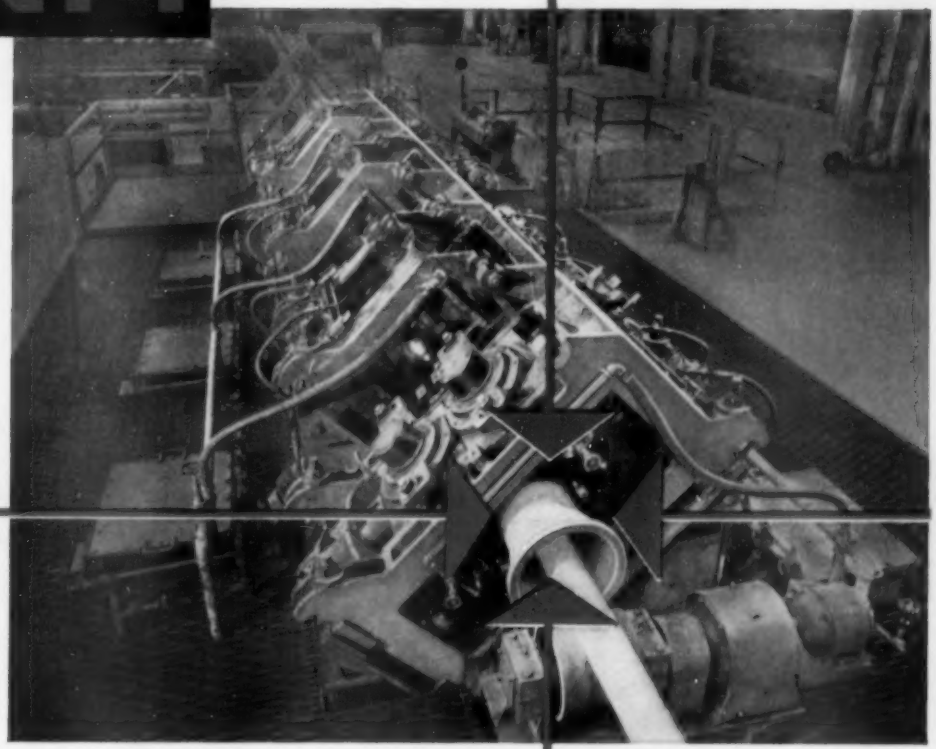
AUXILIARY EQUIPMENT

HT-100 hook block
4-SX swivel
RSH-18 rotary.

THE **BREWSTER** COMPANY, INC., SHREVPORT, LOUISIANA

made right . . . sized right

at the **CF&I** **SEAMLESS TUBE MILL**



Final step in the hot mill production of seamless tubular products is the sizing operation, whereby tubes that have already been rolled and reeled are reduced by sizing rollers to the specified outside diameter.

As shown here, this is accomplished at the new C F & I Seamless Tube Mill by a seven-stand sizing mill or a fourteen-stand reducing mill—depending upon the outside diameter of the tube. Tubes four inches and larger are passed through the seven-stand mill, while tubes 3½ inches and smaller pass through the fourteen-stand mill.

Here again, the most modern fabricating facilities and advanced production techniques combine to insure seamless tubular products of the highest quality and utmost accuracy in diameter.

C F & I Seamless Oil Country Tubing and Casing meet API STD 5A specifications and are available in sizes from 2⅜″ O.D. through 9⅝″ O.D.

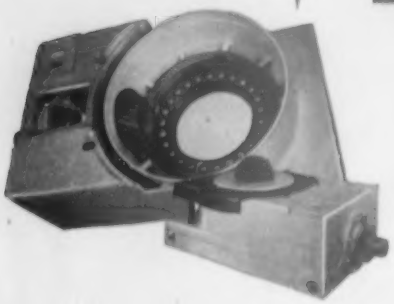
CF&I TUBULAR PRODUCTS
THE COLORADO FUEL AND IRON CORPORATION
DENVER, COLORADO

2350

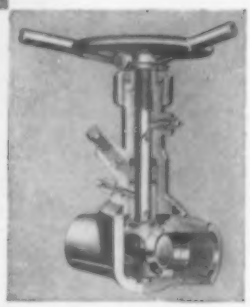
Aetna Bearings

HELP OIL COUNTRY EQUIPMENT WORK BETTER LONGER

BETHLEHEM B-21-TA ROTARY TABLES carry their tremendous loads on custom-built Aetna main bearings. Equipped with 3" balls, these 33½" O.D. angular contact bearings handle live loads of 195 tons at 100 R.P.M. and more on rugged day-and-night schedules with positive dependability.



FRANKS MFG. CORP. uses precision-engineered, custom built Aetna bearings in the drawworks drums of its oil well servicing and drilling units to insure maximum free rolling operation, greater strength, minimum wear and longest service life.



ORBIT VALVES, well known for their ease of operation and unfailing ability to seat properly even in extremely hot or cold climates and under pressures up to 10,000 lbs., are equipped with Aetna bearings to add further assurance of long service life.

Every oil country equipment manufacturer who tries Aetna bearings discovers the same thing . . . that these fine bearings are unexcelled for dimensional and metallurgical uniformity . . . for smooth, trouble-free service and life-stretching reserve capacity.

If you make hard working country equipment you well know how important good bearings are. Make sure that you get them by specifying Aetnas. Our engineers will work closely with you to help insure the most successful and efficient anti-friction performance of the equipment you make today—or plan to make tomorrow. Write us today.

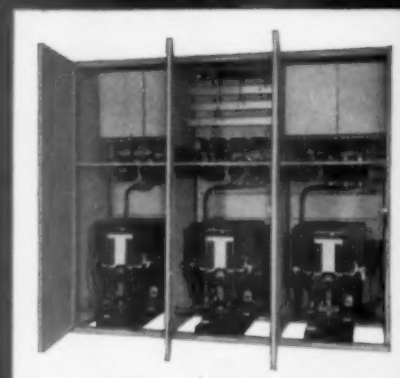
AETNA BALL AND ROLLER BEARING COMPANY

Division of Parkersburg-Aetna Corporation

4600 SCHUBERT AVENUE • CHICAGO 39, ILLINOIS • *Representatives — Distributors from Coast to Coast*

Aetna BALL BEARINGS • ROLLER BEARINGS • MISCELLANEOUS PRECISION PARTS

"Starting Line-up"



Rear view of HALC Controller Line-up. Bus covers provide maximum protection for personnel and equipment. Starters may be equipped with either oil-immersed or air-break contactors . . . installed in the same space. All components are readily accessible for maintenance.

ALLIS-CHALMERS
Type H Starters
FOR 2300 TO 5000 VOLT MOTORS

FACTORY ASSEMBLED CONTROL GROUPS ARE

▶ Easy to Install ▶ Simple to Expand ▶ Attractive in Appearance

The factory assembled line-up of Type H Starters affords the many advantages of centralized high voltage control for an entire department or plant. One attractive, space-saving group takes the place of many separate cabinets and components. Planning and purchasing are simplified. Installation is quick and easy — only one incoming power feeder required. Internal bus and convenient wiring provisions plus standardization of cubicle size facilitate the addition of starters.

Allis-Chalmers Type H Starters may also be used singly. Each starter is a complete control unit. Contactors, protective devices, meters, relays . . . all the coordinated components necessary for maximum protection of man, motor and machine are engineered into each starter. A-4217

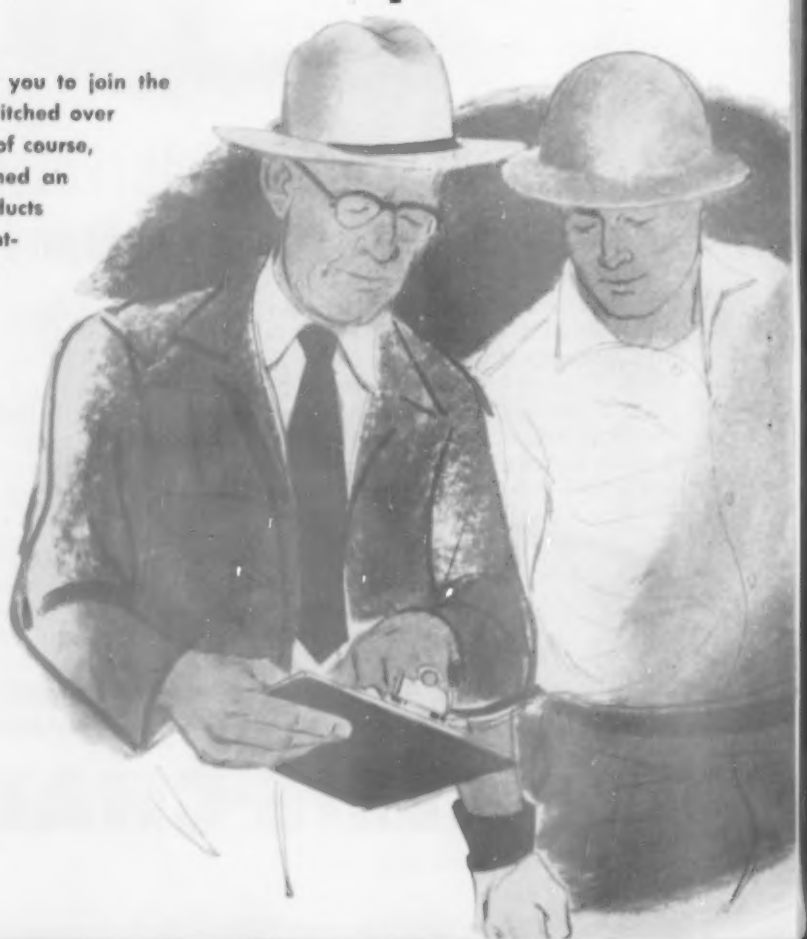
New Bulletin — Type H Starters are built in a wide range of ratings for squirrel-cage, wound-rotor and synchronous motors . . . for full or reduced voltage . . . reversing or non-reversing . . . with plugging, dynamic braking and multi-speed features. New bulletin 14B6410B tells the complete story. See your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

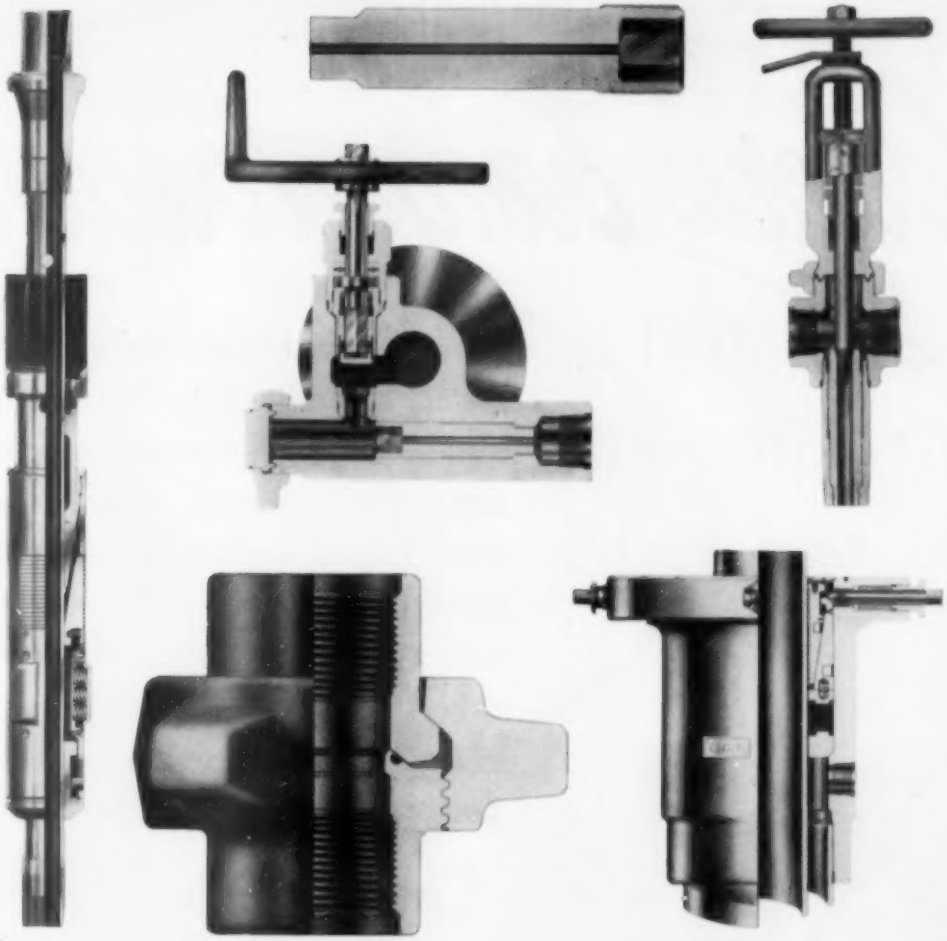
ALLIS-CHALMERS

ECONOMY
SERVICE
SAFETY

It's the extra value that makes O C T stand out

There are many good reasons for you to join the growing list of oil operators who have switched over to O-C-T Products. The best reason of all, of course, is the fact that O-C-T Products have earned an industry-wide reputation as the finest products money can buy. This record-for-consistent-performance has been marked up in wells of all depths and pressures. Isn't it logical then that you should learn about the added strength, safety, convenience and flexibility provided by dependable O-C-T products? Let us furnish complete information and quotations on your next well. No obligation. Write today or talk to your O-C-T Representative.





Oil Center Tool Co.

P. O. BOX 3091, HOUSTON, TEXAS

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

Modern barge loading

Barge loading has gone Modern! A. O. Smith Meters put an end to the old-fashioned method of barge strapping with its inaccuracies, uncertainties, misunderstandings. Now, refined product is measured with utmost accuracy by A. O. Smith Meters. Delivery to barges is recorded on printed tickets. An important accessory on this cost-reducing installation is the A. O. Smith Automatic Slow-closing Set Stop Valve.

For complete information, see nearest representative or write, A. O. Smith Corporation, Meter Division, 5715 Smithway St., Los Angeles 22, California.

Close-up of battery of six A. O. Smith S-75 Meters equipped with Slow-closing Set Stop Valves. Each two in parallel handles 1500 gallons per minute. Location: Wood River, Illinois floating dock owned by Standard Oil Company of Indiana.

80th YEAR 1874 - 1954

A.O.Smith

CORPORATION

METER DIVISION

Factories: 5715 Smithway St., Los Angeles 22, Calif., P.O. Box 500, Succasunna, N. J. Offices: Atlanta, Chicago 7, Houston 20, Los Angeles 22, New York 17. Canada: Toronto 12, Vancouver 1. International Division—Milwaukee 1, Wisc.

THE ECONOMIES OF 73% CAUSTIC SODA SOLUTION are no longer reserved for the largest users . . . lower shipping costs now make it the best form for you, too.

73% CAUSTIC SODA . . .

a little figuring may prove it your best buy!

FAST, DEPENDABLE DELIVERY of uniform 73% caustic solution is assured through use of Dow-owned tank cars. These 8,000- and 10,000-gallon cars are insulated, protectively lined, and fitted with nickel heating coils; unload from top or bottom by air pressure or pump. Frangible discs, protective plug cocks are two of the advanced safety features.

How long has it been since you have checked your caustic buying habits in the light of increasing cost factors? Higher freight rates are erasing the savings in 50% caustic solution for more and more users every day. Even users located near shipping points save money with 73%, since the higher price of even shorter distance hauls quickly wipes out the price difference between 73% and 50%.

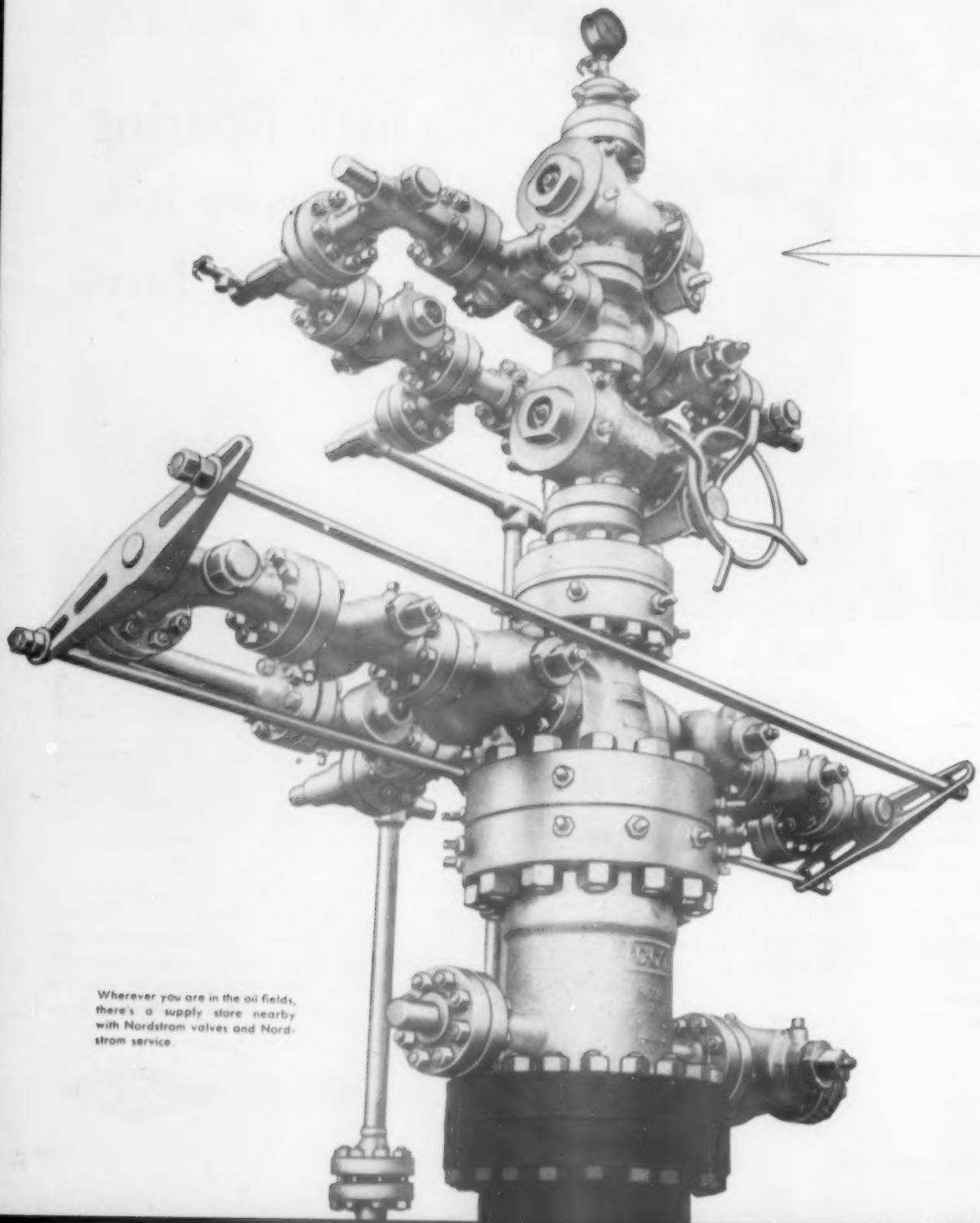
73% caustic must be diluted when received, but most caustic users dilute 50% solution, too. The cost of additional handling equipment for dilution, when fairly amortized, becomes a small item in comparison to your over-all cost reduction.

If you are still buying 50% caustic solution, discussion in your plant and consultation with our Alkali Technical Service is indicated. Perhaps the comprehensive Dow Caustic Soda Handbook can help you in preliminary discussion. Ask your Dow sales representative for your free copy or write to THE DOW CHEMICAL COMPANY, Dept. AL 901C, Midland, Michigan.

you can depend on DOW CHEMICALS

Any Way You Look At It

ROCKWELL-Nordstrom **is the**



Wherever you are in the oil fields, there's a supply store nearby with Nordstrom valves and Nordstrom service.

Best Christmas Tree Valve

And here are the sound reasons why

EASY TO OPERATE — *Any time!*

Even after a Rockwell-Nordstrom valve has operated in one position for long periods under adverse field conditions, it can be opened or closed with minimum effort. The plug and body bearing surfaces are lubricated, and lubricant also hydraulically lifts the plug away from the body to permit easy operation.

SURE SHUT-OFF — *Every time!*

Rockwell-Nordstrom lubricant has another purpose: it acts as a plastic seal around the valve ports, constantly renewed from the internal lubricant reservoir.

LONG LIFE — — *Always!*

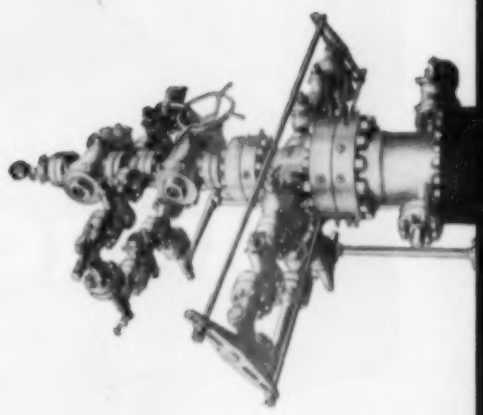
Since lubricant prevents metal-to-metal contact, plug and body seat life is far, far longer. Lubricant is the natural foe of the abrasion that causes wear.

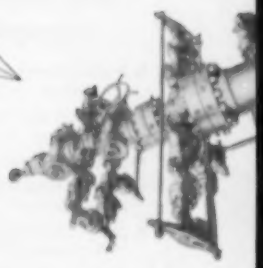
It's wise to specify Nordstrom valves for wellhead service. Rockwell-Nordstroms are made in all required sizes and pressure classes, standard or Hypreseal patterns, carbon or stainless steels, and with Merchrome hard-faced body and plug for the higher pressures. Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Licensee: Peacock Brothers Limited*

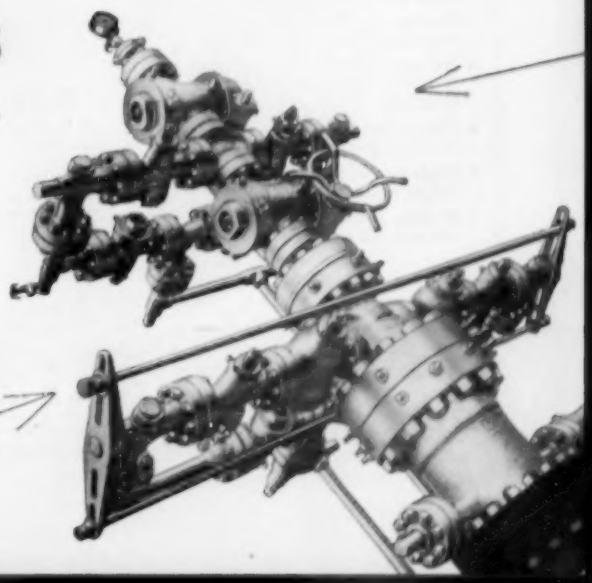
ROCKWELL

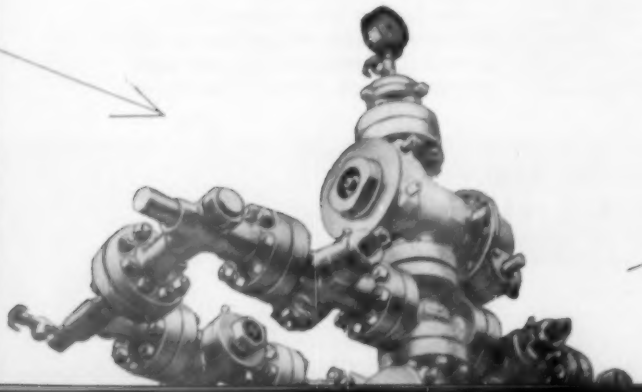
Nordstrom **VALVES**

Lubricant-Sealed for Positive Shut-Off





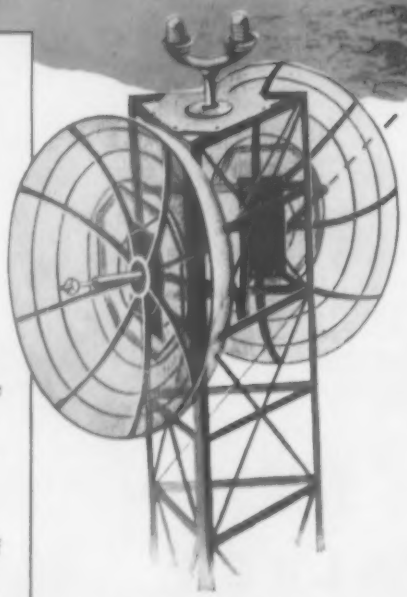




OVER 6,000 ROUTE-MILES of RADIO RELAY SYSTEMS *INSTALLED*

High Points of PTM ENGINEERING and PERFORMANCE

- Pulse-Time Modulation assures maximum circuit reliability.
- Simplest and smallest RF equipment.
- Highest RF power output.
- Fewest tubes—lowest maintenance.
- Simple intermediate drop and insert equipment.
- Simple individual common type channeling units.
- Simple delay line method insures channel synchronization.
- Unaffected by fog, rain, snow, ice, static or magnetic storm.
- High signal-to-noise ratio.
- Outstanding for high quality of voice and other transmission.
- No inter-channel cross-talk due to non-linearity of common elements.
- Energy beamed by non-critical directive parabolic reflectors.
- High power provides large fading margin.
- 99.22% reliability achieved without RF stand-by.



MICROWAVE MOVIES:

Be sure to see Federal's 16 mm. sound-and-color motion pictures: "Microwave Communications for Power Utilities"..."Pipeline Communications With Microwave"..."Microwave for Modern Telephony"..."Railroad Operation With Microwave"..."Modern Communications With Microwave." Prints shipped without charge for company showings. Write to: *Film Distributing Department.*

SUCCESSFUL operation in many industries proves Federal's PTM is better because of its *inherent simplicity*...!

Streamlined circuitry—fewer tubes! That's the basis of Federal Pulse-Time Modulation Microwave superiority... for multi-channel radio relay systems of *any* length... over *any* terrain!

Federal PTM gives pipelines, power utilities, telephone companies, railroads and others complete, simultaneous, all-weather voice and signal facilities... without costly line construction and maintenance.

Proved-in services include: toll circuits, dialing, dispatching, telemetering, supervisory and remote control, teleprinter, telegraph, speech-plus-duplex, mobile radio... in fact, *all industrial communications needs.*

Get the facts about Federal PTM... backed by decades of experience in engineering, system planning and turnkey installations. Write to Dept. H-252.

Federal Telephone and Radio Company

PTM AND WIRE TRANSMISSION SALES — 100 KINGSLAND ROAD, CLIFTON, N. J.

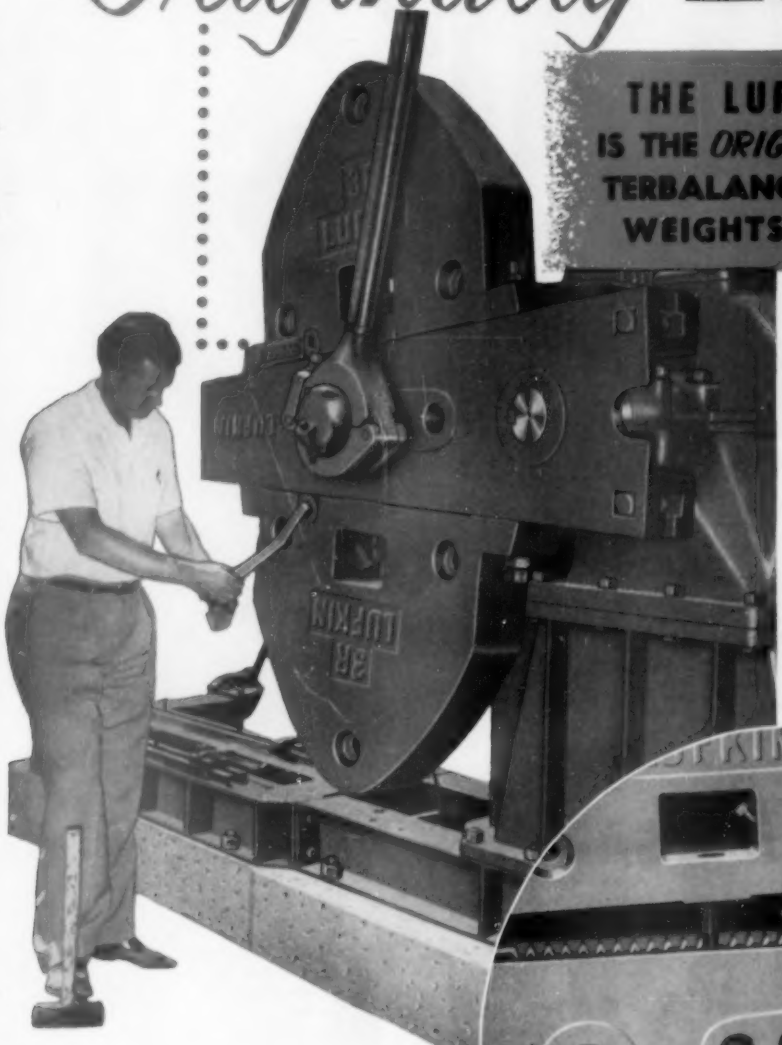
In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

IT'S A FACT...

IT&T scientists conducted the *first* successful demonstration of voice communication via *microwave*, March 31, 1931, across the English Channel.

Originally LUFKIN

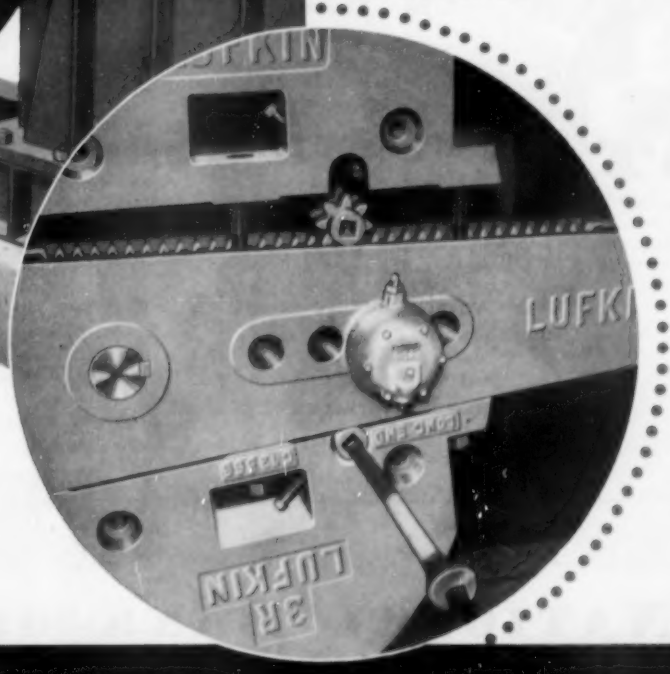
THE LUFKIN TROUT CRANK IS THE *ORIGINAL* ADJUSTABLE COUNTERBALANCED CRANK! NO LOOSE WEIGHTS TO ADD OR REMOVE



NOW BUILT WITH RACK AND PINION FOR GREATER EASE AND CONVENIENCE IN MOVING THE COUNTERWEIGHTS.

ALL FOUR COUNTERWEIGHTS CAN BE ADJUSTED WITHOUT REPOSITIONING CRANKS.

THE SAME RUGGED SIMPLICITY WITH ADDED SAFETY AND CONVENIENCE.



A ONE MAN CREW IS ALL THAT'S NECESSARY

Lufkin FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas, Effingham, Illinois, Duncan, Oklahoma, Brookhaven, Mississippi

Lufkin Equipment in CANADA is handled by

THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, Edmonton, Alberta, Canada.

Specialized

NATIONAL BANK OF TULSA
NBT

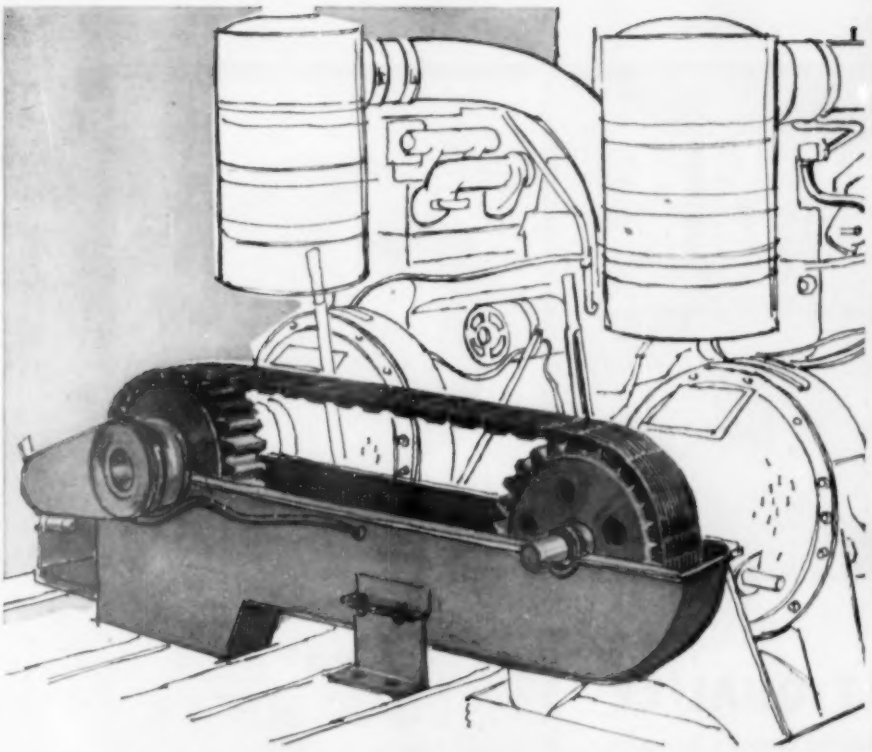
Oil Financing

- Our full-time integrated oil department includes engineering, legal and field representation.
- Our capital structure is sufficient to meet your oil financing needs.
- Our petroleum engineering and geological files are available for accurate evaluation.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

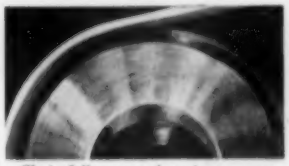
NATIONAL BANK OF TULSA

The Oil Bank of America



Hy-Vo's many design and manufacturing refinements result in a drive with unusual power transmitting capacity. Note involute tooth design of Hy-Vo Sprockets . . .

. . . and the new, Hy-Vo Compensating Rolling Joint, which always shifts the pitch line automatically as the Hy-Vo Chain engages the involute teeth of the sprocket.



Chain follows a path truly tangent to sprocket pitch circle, virtually eliminating chordal action. A new, balanced link design greatly improves stress distribution.

How compounding with HY-VO could save you as much as $4,560

Now, you gain new advantages in buying and compounding smaller, higher speed engines with Morse Hy-Vo Drive.

You make major cost savings.

The total cost of two high-speed engines and the Hy-Vo Drives with which they are compounded, will usually be considerably less than a single large engine of equivalent horsepower. A brief look at some figures will show how this works . . .

For example, if you needed 250 continuous horsepower at 1200 rpm., you could: 1) Buy a manufacturer's 250 hp., 1200 rpm. engine, which lists for $13,380; 2) buy the 250 hp., 1800 rpm. engine for $11,930 (using Hy-Vo as a connection and reduction drive, also eliminates the costly flexible coupling normally required in choice No. 1); 3) or, use two 130 hp., 1800 rpm. engines, listing for a total of $8,820, and use Hy-Vo as your compounding drive.

With the 250 hp., 1800 rpm. engine, you save $1,450—more than enough to pay for your Hy-Vo Drive. Compounding two 130 hp., 1800 rpm. engines, you save $4,560 over base list cost of the 250 hp., 1200 rpm. engine.

From this saving you could pay for your Hy-Vo Drive and bank several thousand dollars. In most cases, too, Hy-Vo will be so narrow it will eliminate costs of outboard bearings and mountings, with the bonus that single-engine operation is possible under reduced power requirement.

Other power transmission methods generally have either inherent restrictions on rotative speeds and velocities that limit 200 hp. or larger engines to 1200 rpm., or are too costly. Hy-Vo has far greater upper limits, with relatively lower cost.

Because of exceptional rotative speeds and velocities, Hy-Vo brings you comparable savings in electric motors, too. Write us for details on compounding with Morse Hy-Vo Drive.

MORSE CHAIN COMPANY

7601 Central Ave. • Detroit 10, Michigan

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893

TRET-O-LITE
DEMULSIFIERS

TRETOLITE COMPANY
Tret-O-litE
SAINT LOUIS LOS ANGELES

EFFICIENT
because of many years of laboratory research and field development.

HIGHEST QUALITY
and dependable uniformity, because of strict manufacturing specifications, rigidly controlled.

for ECONOMICAL RESULTS
quick delivery and prompt service assistance, call Tretolite.

EFFECTIVE
because of the helpful, always- available Tretolite engineering service.

TRETOLITE COMPANY
A DIVISION OF PETROLITE CORPORATION
369 Marshall Ave., Saint Louis 19, Missouri
5515 Telegraph Road, Los Angeles 22, Calif.

CHEMICALS AND SERVICES FOR THE PETROLEUM INDUSTRY

DEHYDRATING • DESALTING • CORROSION INHIBITING
PARAFFIN REMOVING • WATER DE-OILING • SCALE PREVENTING

TF 54-7

catalysis +*

at Baltimore

1

hydroforming unit

3

hydrofining units

Foster Wheeler will design and construct for the Esso Standard Oil Company, at the Baltimore refinery, 3 Hydrofining units (catalyst + hydrogen) for the desulfurization and general quality improvement of napthas and heating oils . . . and a fixed-bed Hydroforming unit (catalyst + hydrogen) for Octane upgrading of heavy naptha.

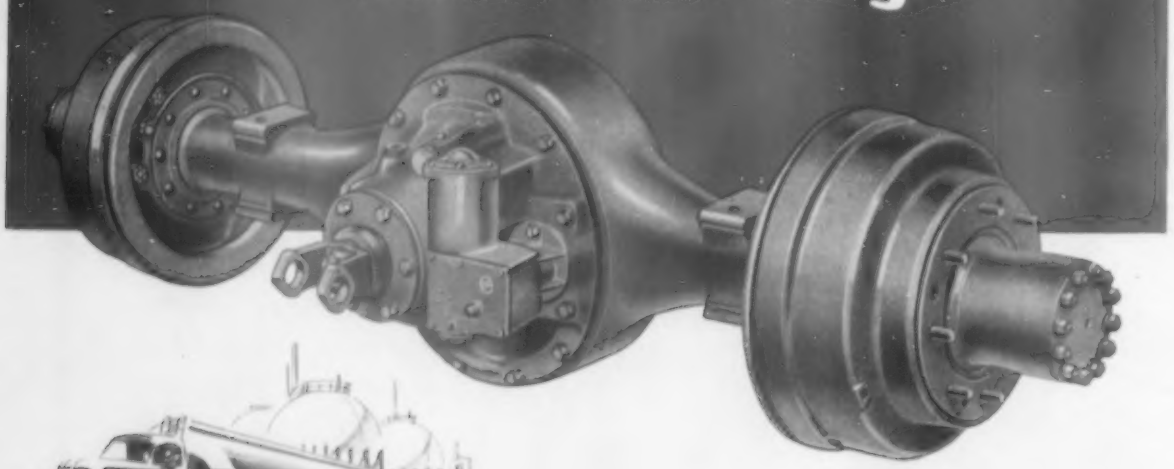
These process units will incorporate the latest technological application of catalysis in sulfur reduction and reforming as developed by the Standard Oil Development Company.

FOSTER WHEELER

the complete engineering and construction service anywhere in the world

**kata, wholly + lyein, to loose (Gr.)*

Eaton 2-Speed Axles save engines, keep trucks on the job, reduce operating and maintenance costs, make trucks last longer



More than two million Eaton Axles in trucks today! For complete information, see your truck dealer.

Eaton 2-Speed Axles double the conventional number of gear ratios, enabling drivers to select a ratio to deliver pulling power or speed—the ratio best suited to road and load conditions. Engines operate in their most efficient and economical speed range, reducing stress and wear on engine and power transmitting parts, holding operating and maintenance costs to a minimum, adding thousands of miles to engine and over-all vehicle life. Eaton 2-Speed Axle trucks haul more, faster, longer, at lower cost—are worth more when traded in.

EATON
2-Speed Truck
AXLES

Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

the complete line FOR ALL YOUR NEEDS

YOU CAN specify TUBE-TURN Welding Fittings and Flanges and know that you will get the *exact* answer to your specific piping problem. This leading line includes more than 4,000 items, in all piping materials . . . carbon steels, non-ferrous metals and alloys . . . schedules and sizes to match *your* design.

Carbon steel elbows, for example, are available from ½" to 42" diameter. Your nearby Tube Turns' Distributor provides this *complete* line promptly and backs it up with the thorough Engineering Service and how-to-do-it information of Tube Turns.

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Toledo • Chicago • Denver • Los Angeles San Francisco • Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

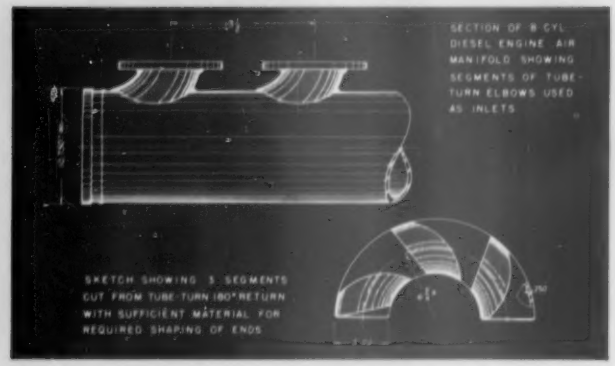
ENGINEERING SERVICE

Here's *Service* to help you solve your piping problems

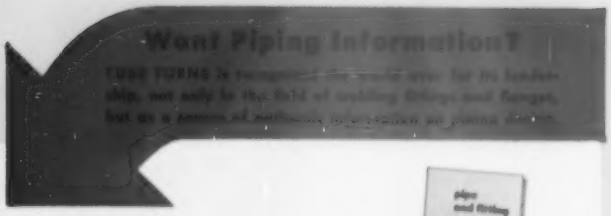
TUBE TURNS' Engineering Service Division makes available a vast fund of experience for the solving of design and operating problems in piping. For example:

An engine builder was fabricating manifolds from formed plate. Poor fitup was a problem and costs were excessive. Tube Turns' engineers suggested using TUBE-TURN Welding Returns, cut with templates as shown in the sketch. Costs came down. The dimensional uniformity of TUBE-TURN Welding Returns and Elbows simplifies fabrication jobs such as this because they can be cut to odd angles and adapted to special requirements.

TUBE TURNS IS AT YOUR SERVICE!


SECTION OF 8 CYL. DIESEL ENGINE AIR MANIFOLD SHOWING SEGMENTS OF TUBE-TURN ELBOWS USED AS INLETS
SKETCH SHOWING 3 SEGMENTS CUT FROM TUBE-TURN 180° RETURN WITH SUFFICIENT MATERIAL FOR REQUIRED SHAPING OF ENDS

Header connection design problem solved by Tube Turns' Engineering Service.



TUBE TURNS, Dept. J-3
224 East Broadway, Louisville 1, Kentucky

Please send me free copy of Pipe and Fittings Materials.

Company Name .....

Company Address .....

City ..... *Zone* ..... *State* .....

Your Name .....

Position .....

YOUR NEEDS in welding fittings and flanges are met *promptly* by your Tube Turns' Distributor. This one reliable source can fill *all* your requirements from the world's most complete line of welding fittings and flanges comprising more than 4,000 items.

ALUMINUM. To prevent contamination of the product, and assure permanently leakproof construction, this refinery's new TCR bead catalyst plant uses welded aluminum piping such as shown for certain services. TUBE-TURN Aluminum Welding Fittings and Flanges are used in this piping. Pipe sizes vary from 1" to 10".

DISTRICT OFFICES

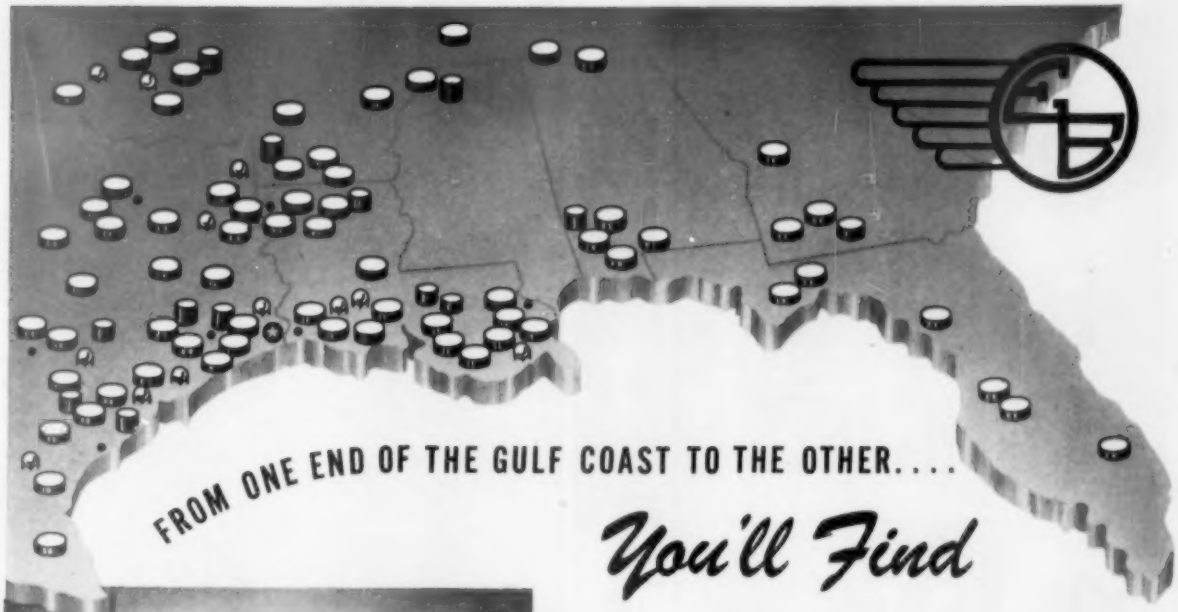
New York	San Francisco
Philadelphia	Seattle
Cleveland	Atlanta
Chicago	Tulsa
Denver	Houston
Los Angeles	Dallas
Midland, Texas	

"tt" and "TUBE-TURN" Reg. U. S. Pat. Off.

TUBE TURNS

LOUISVILLE 1, KENTUCKY

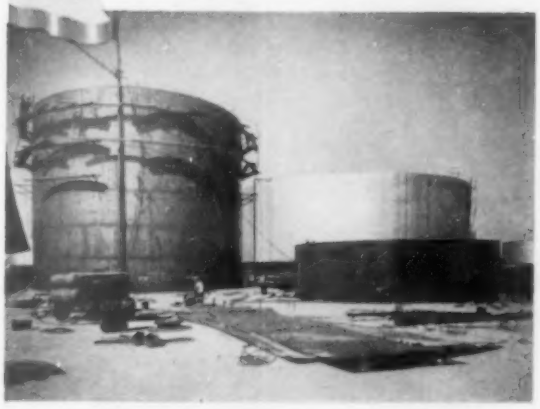
A DIVISION OF NATIONAL CYLINDER GAS COMPANY



FROM ONE END OF THE GULF COAST TO THE OTHER....

You'll Find

ELLERBEE TANKS



Erection of two medium size dome roof tanks.

Hanging a plate on a 96,000 barrel tank.

A completed 120' diameter x 48' high cone roof tank.

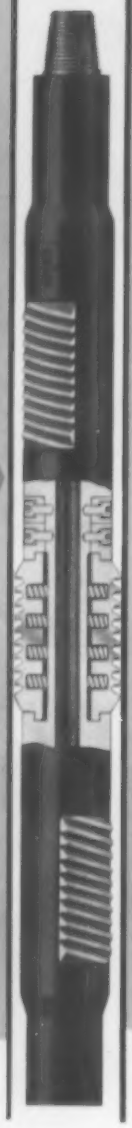
Among the many reasons why so many tanks in the Gulf coast area have been erected by Ellerbee Brothers—why so many of our clients attest to our superior service—is the attention to detail—in every step of the job from drawing board to finished tank. Every seam, every plate is exactly according to specifications—and there is an Ellerbee inspector on every job to make sure. It's trite—but still true—that the little things make a big difference in our service. Next time let us quote on any of your requirements for field erected storage tanks and spheres.

ELLERBEE BROTHERS

P. O. Box 857 Port Arthur, Texas

Phone 2-6424

LOOK AT THE ENGINEERED ADVANTAGES OF VERTICAL SCRAPING WITH GRANT!



FOR ANY SCRAPING JOB where either rotation or wire line operation is desired, this Grant Vertical Casing Scraper has a dozen important advantages — advantages *engineered* for maximum safety... for greatest efficiency... for extreme versatility to meet *all* well conditions...

- ...it can be run either on a string of tubing or on the wire line
- ...full circulation can be established if required
- ...a single tool scrapes all weights of the casing size through which it will run
- ...the 3 sets of spring-loaded cutters are so spaced as to more than cover the casing circumference
- ...cutter spacing is engineered for unrestricted circulation
- ...the numerous hard-faced cutting edges contact the casing constantly, and are helically designed for efficient shearing action against burrs, foreign material
- ...cutters are held by a fool-proof locking means, yet are quickly and easily changed in the field when worn.

Add to these advantages the field-proven wearing qualities of the Grant Vertical Scraper... and the safety of the finest heat treated alloy steels... and you have the important reasons why your next scraping job should *specify Grant!* The Grant is available in a complete range of sizes for all casing diameters from 4½" to 11¾".

Grant Bulletin 59 gives complete technical data on Grant Vertical Casing Scraper. Send for your copy — today.

GRANT

OIL TOOL COMPANY

Main Office & Plant

2043 E. Vernon Ave., Los Angeles 58, California

California — Ventura — Phone Miller 3-6767 • Avenal — Phone 228

Bakersfield — Phone 50507 • Compton — Newmark 5-8041

Texas — Odessa — Phone 64482 • Wyoming — Casper

The Right Move...

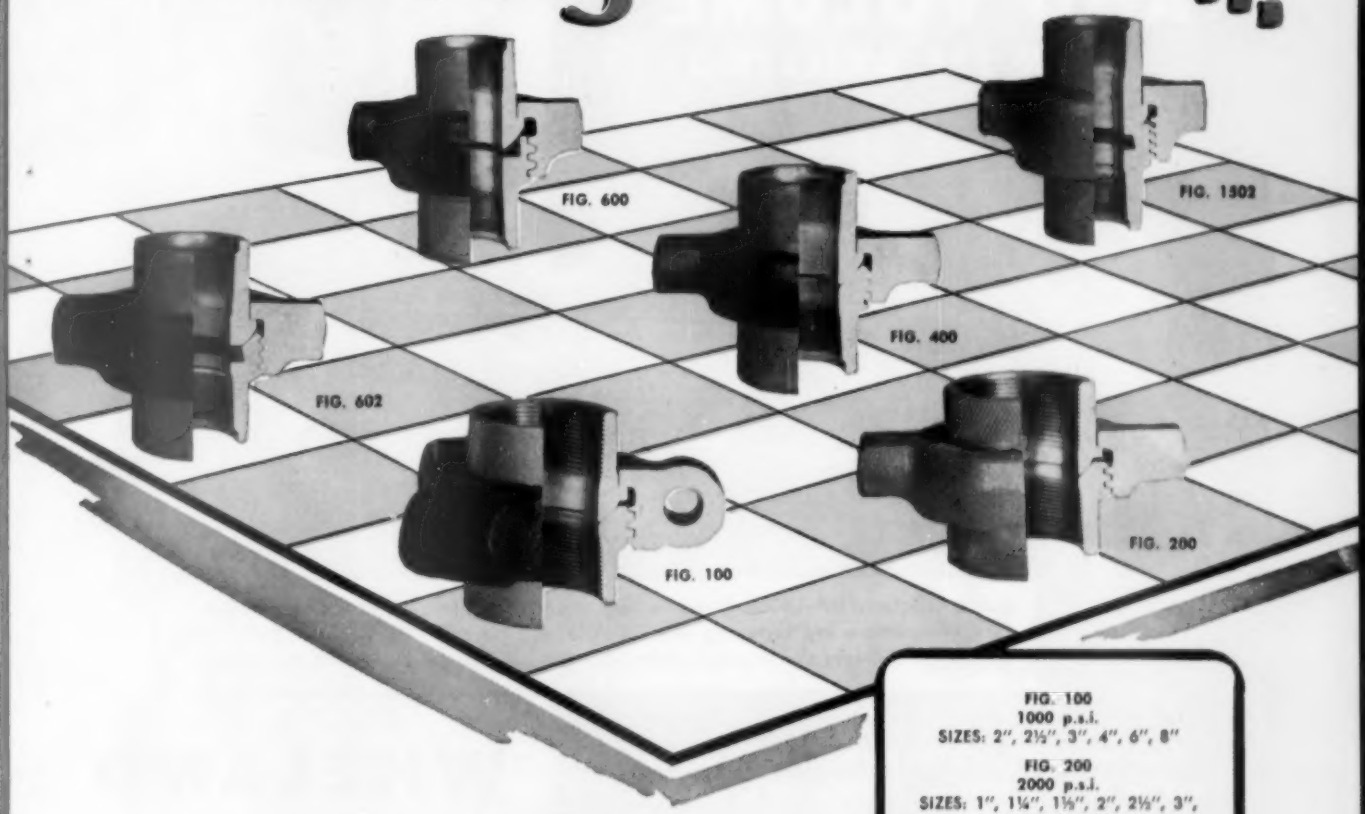


FIG. 100
1000 p.s.i.
SIZES: 2", 2½", 3", 4", 6", 8"

FIG. 200
2000 p.s.i.
SIZES: 1", 1¼", 1½", 2", 2½", 3", 4", 6", 8"

FIG. 400
4000 p.s.i.
SIZES: 2", 2½", 3", 4", 5½" O.D., 6", 7" O.D., 8", 10"

FIG. 600
6000 p.s.i.
SIZES: 1", 1½", 2", 2½", 3", 4"

FIG. 602
6000 p.s.i.
SIZES: 1", 1¼", 1½", 2", 2½", 3", 4"

FIG. 1502
15,000 p.s.i.
SIZES: 2", 2½", 3"

WECO UNIONS are *ALWAYS Right!*

You just can't make a wrong move when you standardize with WECO because there's a Union that is exactly right for every oil industry service from the drilling rig to the transport truck.

The famous ball and cone seat assures a positive seal. The strong durable construction assures long life and economy. They make up and break out repeatedly without damage to seats or threads.

Selected raw materials, advanced manufacturing practices, rugged Acme threads, heavier wall sections and precision seating surfaces mean you can trust WECO Unions for sealing and service.

PESA

it's wise to standardize with... **WECO**

WECO

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

THE BEST BALANCE OF PRESSURE AND VOLUME FOR JET DRILLING!

See a Wheland HP-14000 Pump in operation—you'll learn how drilling contractors everywhere are reducing drilling time and bit costs as much as 50%! The HP-14000 delivers the pressure and volume it takes for making hole in a hurry.

The Wheland HP-14000 is *the* pump for jet drilling . . . and the best pump for jet drilling is the best pump for *any* drilling

Like any pump used on jet drilling, this pump must be fitted with proper size liner and run at correct speed and pressure in relation to:

1. Size, condition and depth of hole.
2. Type and size of drill pipe, drill collars and jets in bit.

***DATA SHEETS** from actual jet drilling performance available on request. Write for detailed bulletin*

WHELAND

HP-14000 7½" x 14"

DUPLEX SLUSH PUMP

350 HORSEPOWER
NOMINAL INPUT AT 60 R.P.M.

Discharge Pressure
with 7½" liners 838 PSI
Discharge Pressure
with 5½" liners 1627 PSI

TRADE WHELAND MARK

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
TRAVELING BLOCKS • SWIVELS

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
ROTARY DRILLING MACHINERY

DOMESTIC DISTRIBUTORS & THEIR HEADQUARTERS: Jones & Laughlin Steel Corp., Supply Division, Tulsa, Okla. • Houston Oil Field Material Co., Inc., Houston, Texas • Iverson Supply Co., Tulsa, Okla. • Lucey Products Corp., Tulsa, Okla. • Superior Iron Works & Supply Co., Inc., Shreveport, La. • Industrial Supply Co., Wichita Falls, Texas
EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England

"Save money? Sure!"

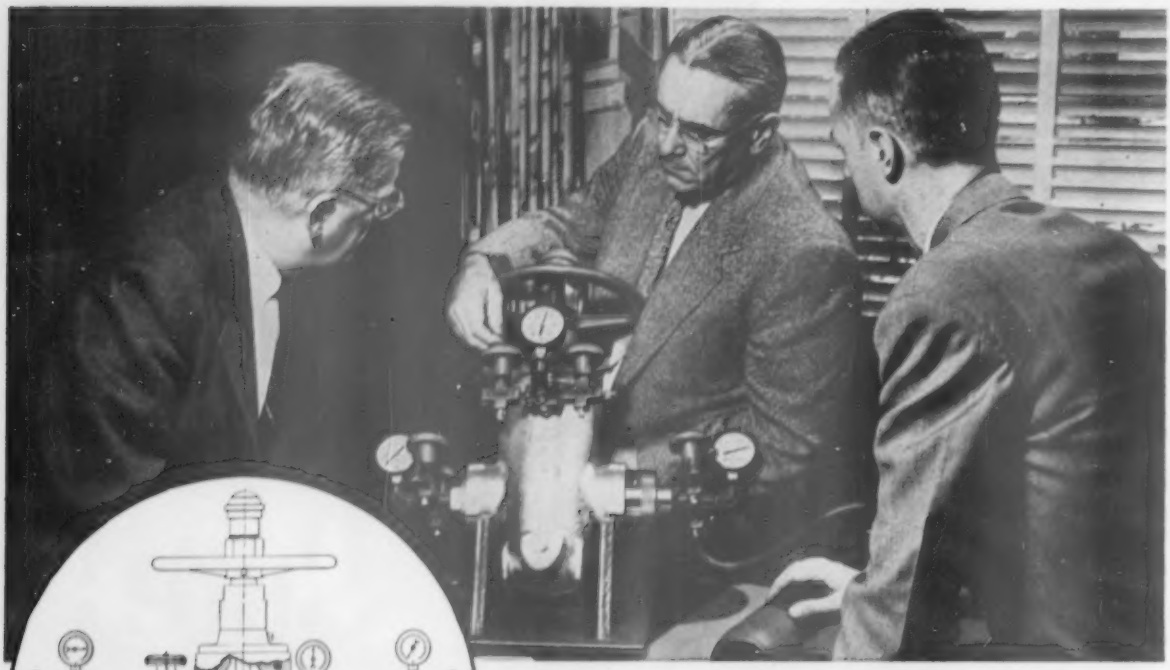
THAT, in a nutshell, tells you why so many wire rope users in the oil fields prefer Roebling wire rope... it speeds up operations... lasts longer on the job ...saves money that really adds up.

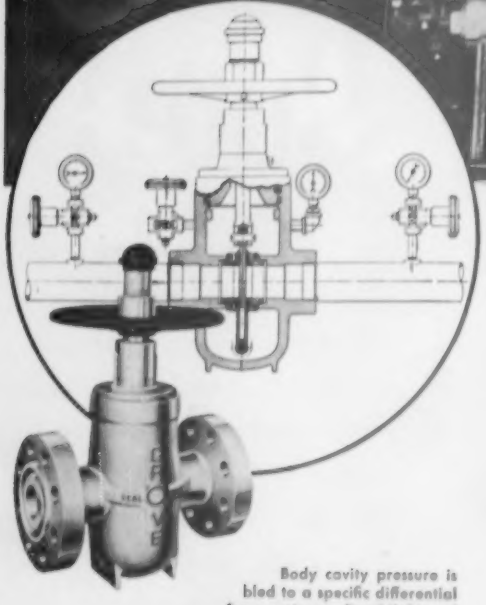
For the last word in wire rope efficiency and economy, call your nearest Roebling office or distributor for a Roebling recommendation.

ROEBLING CF&I
A subsidiary of The Colorado Fuel and Iron Corporation

THERE IS A ROEBLING DISTRIBUTOR NEAR YOU

WE'LL MAKE THIS TEST WHEREVER YOU SUGGEST





Body cavity pressure is bled to a specific differential from upstream. Dead-tight seal is verified by non-variance of cavity pressure gauge.

The only gate valve you can check in the line—any time.

SEE FOR YOURSELF HOW GROVE SEAL-"O"-RING GATE VALVES CAN BE CHECKED IN THE LINE...for positive dead-tight seal and free-moving gate action

Your Grove sales engineer is equipped to demonstrate this new field method of testing and checking the dead-tight seal and free-moving gate action of Grove Seal-"O"-Ring Gate Valves—*right in your office,* or wherever you suggest. Simulating actual conditions, this test proves conclusively that Grove Seal-"O"-Ring Valves hold tight as a line blind, yet permit free movement of the hand-wheel at all times. Also, excess body cavity pressure is automatically relieved *internally* to the upstream line by piston-action of Seal-"O"-Ring seat assemblies, actuated by pressure differential. This test set-up shows how you can install this system for checking Grove valves right in the line—at any-time—without loss of gas or liquid. You must see it—to believe it. Contact your nearest Grove District Office today, to arrange for test demonstration.

GROVE SEAL-"O"-RING Gate Valves

GROVE REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California

HOUSTON 4—1901 Calumet St. • **LOS ANGELES 6**—1930 W. Olympic Blvd. • **NEW YORK 17**— 415 Lexington Ave.

GROVE SIMPLICITY ACCURACY SAFETY

CORPUS CHRISTI, TEXAS	ODESSA, TEXAS	TULSA, OKLAHOMA	LAFAYETTE, LA.	NEW ORLEANS, LA.	DENVER, COLO.
4534 No. Baldwin Blvd.	114 N. Washington St.	318 Thompson Bldg.	Scott Road	504 Delta Bldg.	2669 Cherry St.

When you buy welding elbows . . .

Why take less when you can get more?

. . . (and at the same price)

ADVANTAGES OF MIDWEST "LONG TANGENT" ELBOWS

★ They save pipe.

★ They often eliminate short nipples and their extra welds.

★ They save time and money in lining up and clamping pipe and fitting.

★ They make it easier to apply slip-on flanges.

★ They remove the circumferential weld from point of maximum stress and can be sleeved.

★ THEY COST NO MORE THAN OTHER ELBOWS.

As shown in the illustration above, Midwest "Long Tangent" welding Elbows have straight ends equal to ¼ of the nominal fitting diameter (a 12" elbow has tangents 3" long). For the reasons listed at the left, substantial savings are made on many piping systems by using Midwest "Long Tangent" Elbows. For more information about them, write for Catalog 54.

MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices:

New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.
Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

6722

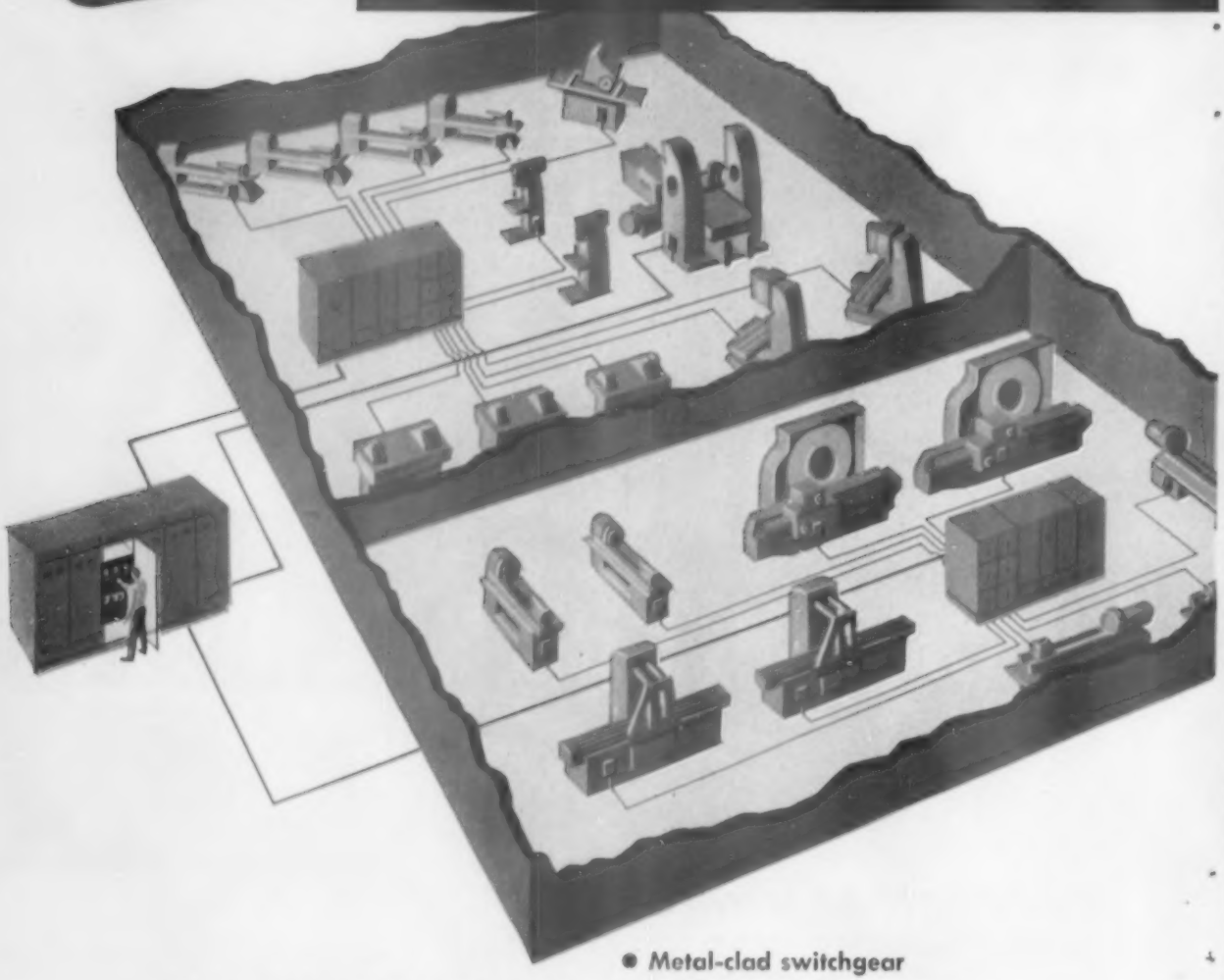
MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

ALLIS-CHALMERS

PROGRESS IN

Switchgear

modernize



MODERN PLANTS USE these items of electrical distribution equipment.

- Metal-clad switchgear
- Load center unit substations
- Bus duct
- Individually enclosed breakers
- Low voltage switchgear
- Frame-mounted oil circuit breakers

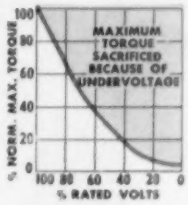
ALLIS-CHALMERS

electrically

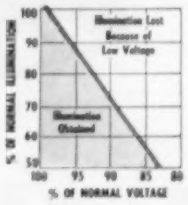
Cut Operating Costs 6 Ways – Improve your Distribution System With Allis-Chalmers Switchgear

In many plants the electrical system grew piecemeal. New machines were added to existing feeders; long, low voltage feeders were added for new groups of machines — and the whole system became inefficient and even dangerous. If this is the case in your plant, here are some of the losses you can avoid by modernizing with Allis-Chalmers switchgear:

1 Torque loss — Torque and horsepower drop when voltage drops below rated voltage of motors. Jobs take longer, because reduced torque necessitates lighter cuts on machine tools. Major cause of undervoltage is long, low voltage feeders. Placing unit substations at load centers shortens low voltage cable . . . improves voltage.



2 Illumination loss — You get less lumens per dollar when voltage is low. In addition, most studies show workers see better, produce more when illumination level is high.



3 Production loss — Standard Allis-Chalmers switchgear designed to accommodate special circuit schemes that will assure uninterrupted power for automation or continuous processing.

4 Motor burnout — Individually enclosed low voltage circuit breakers at each machine protect motors from faults and from overloads that might cause burnouts . . . protects you from lengthy interrupted production.

5 Space loss — Compact Allis-Chalmers switchgear units fit anywhere. Use non-productive areas such as the roof, basement, balcony or space outside near the building.

6 Power loss — Old breakers in many plants are now inadequate to handle a short circuit because of increased system capacity since the time they were installed. A major fault could cause equipment failures and prolonged outages. If your plant is typical, any breaker over 10 years old is probably inadequate today, because of your increased use of power.

get more information

A-C ALLIS-CHALMERS

Allis-Chalmers switchgear engineers can help you solve your electrical distribution problems. Call your nearby A-C district office, or write for further information.

A-4248

Allis-Chalmers
Milwaukee 1, Wisconsin

Send me new 24-page bulletin "Power at Load Centers Pays Off." (11B62858)

Name .....

Title .....

Firm .....

Street .....

City ..... State .....

Creative Contributions to Centralized Process Control...

GRAPHIC PANELS

by FOXBORO

Typical back-of-panel view. Note open framework construction (easily enclosed if desired), terminals tagged for quick identification in field, neat arrangement of tubing and wiring, full accessibility to all instruments.

Years of experience in panel design and construction have equipped Foxboro Panel Engineers with many exclusive techniques . . . methods which bring you unequalled performance in centralized process control.

One typical feature is the use of aluminum strips and shapes, three-dimensional in effect, in bright, permanent colors, to symbolize flow lines and vessels. These are securely attached over the background finish, yet may readily be rearranged when necessary without marring the finish or leaving ugly holes. (If you prefer, painted graphic panels can be furnished.)

Behind the panel, Foxboro's open framework construction and the neat, clean arrangement of piping and wiring permit quick installation and far easier maintenance.

Foxboro's skilled Panel Assembly Department completes the team which provides you with the most efficient and usable Graphic Panels available today. Let us work up a detailed proposal for you.

The Foxboro Company,
605 Neponset Ave.,
Foxboro, Mass.

FOXBORO
Reg. U. S. Pat. Off.

PROCESS CONTROL ENGINEERING

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Where weight and space are critical

New miniature transducers expand the scope of dynamic recording systems

A BASIC PROBLEM in transducer design is reduction of size to a point where characteristics of the device under test are not affected. Two new transducers developed by Consolidated combine unusually small size and weight with operating characteristics fully comparable to previous larger instruments.

The 4-310 Pressure Pickup features a direct-sensing diaphragm and is mountable flush with any surface to avoid both volume changes in the pressure chamber and spurious turbulence patterns. It is valuable for aerodynamic pressure surveys and other high-frequency liquid or gaseous pressure measurements.

The new 4-118 Velocity Pickup is usable at high temperatures in any plane of orientation. Its output equals instruments many times its size and weight, yet it has no loading effect on structures being tested. Applications include turbine, supercharger, rocket and jet engine vibration studies.

4-310 pressure pickup

Sensitivity: 4 mv/v of applied excitation.

Ranges: 5, 15, 50, 150 psi.

Temperature range: —100°F to +250°F.

Sensitive element: 350-ohm, 4-arm resistance bridge.

Excitation: ac or dc.

Linearity and hysteresis: excellent characteristics.

Acceleration response, zero and sensitivity drift: negligible.

Versatility: usable for liquid or gas measurements.

Size: diaphragm diameter ½″, length ⅝″.

Complete specifications in Bulletin 1534A-X3.

4-118 velocity pickup

Output: 100 mv/in./sec. @ 250 cps.

Frequency range: linear ±10% from 50 to 500 cps over range of —65°F to +500°F.

Amplitude limits: to 0.12″ peak-to-peak.

Transverse sensitivity: negligible.

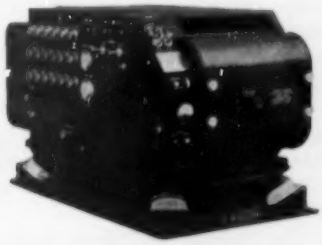
Sensitive element: self-generating, nominal 700-ohm dc coil resistance.

Total weight: 1.3 ounces.

Size: ¾″ diameter, height 1″.

Complete description and specifications in Bulletin 1535-X3.

Vibration can be easily, precisely measured and monitored by combining the Velocity Pickup with Consolidated's Vibration Meters, described in Bulletin 1505B.



Transient or high-frequency vibrations and pressure changes can be recorded for detailed study with Consolidated's Recording Oscillographs. Send for Bulletin 1500B.

Consolidated Engineering

CORPORATION

300 North Sierra Madre Villa, Pasadena 15, California

Sales and Service through **CEC INSTRUMENTS, INC.,** *a subsidiary with offices in: Pasadena, New York, Chicago, Washington, D. C., Philadelphia, Dallas.*

analytical instruments for science and industry

Miniature transducers

Consolidated's new miniature transducers, among the smallest ever designed for pressure and vibration measurement, are adaptable to the most exacting mounting requirements.

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
315 WILSON, SO. NORWALK, CONN.

Cameron Valves

NEED NO LUBRICATION

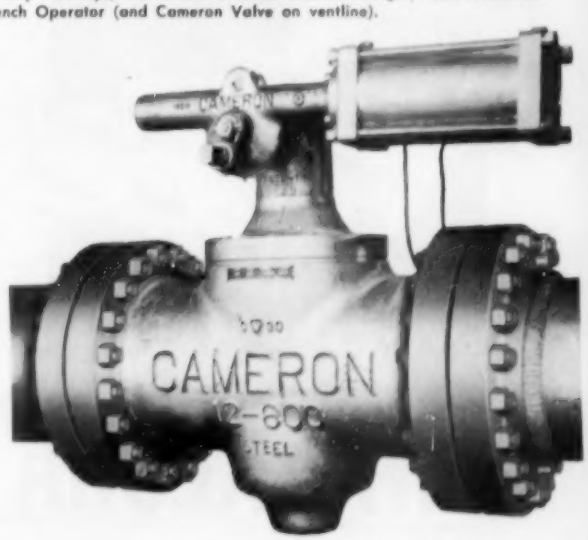
May even be buried!

One of a large number of Cameron Valves on underground gas pipelines near Carthage, Texas. Inset — W. H. "Hap" Phillips, Cameron's Division Sales Manager, with Extension Wrench Operator (and Cameron Valve on ventline).

NON-LUBRICATION ADVANTAGES:

- **Saves lubrication maintenance.**
- **Banishes lubricant inventory.**
- **Prevents contamination of line products and fouling of delicate measuring instruments.**
- **Does away with sticky, difficult operation.**
- **Eliminates necessity of special lubricants for special services.**

Since Cameron Lift-Plug Valves require no lubrication or other periodic maintenance, they may be buried or installed in any inaccessible location. They can be furnished with extension wrenches, as illustrated above, with chain wheel drives, or with mechanical, pneumatic, hydraulic or electric remote controls.



The new Cameron Pneumatic-Hydraulic Valve Operator installed on a Cameron Lift-Plug Valve.

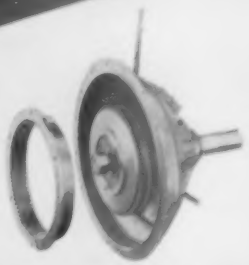
Cameron

IRON WORKS, INC.

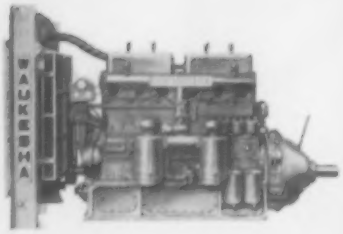
P. O. BOX 1212, HOUSTON, TEXAS

Export Office: 7912 Empire State Bldg., New York City

OUR COMPLETE STOCK MEANS FASTER SERVICE

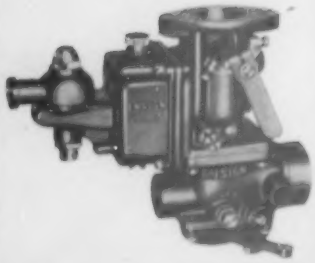


Twin Disc Clutches & Hydraulic Units

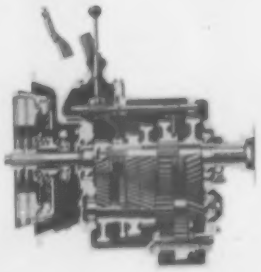


Waukesha Engines and Parts

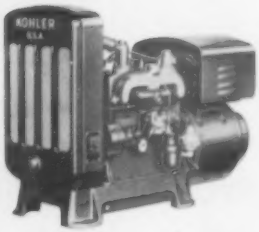
Bosch Magnetos



Ensign Carburetors



Spicer Transmissions and Parts



Kohler Electric Plants and Air Cooled Engines

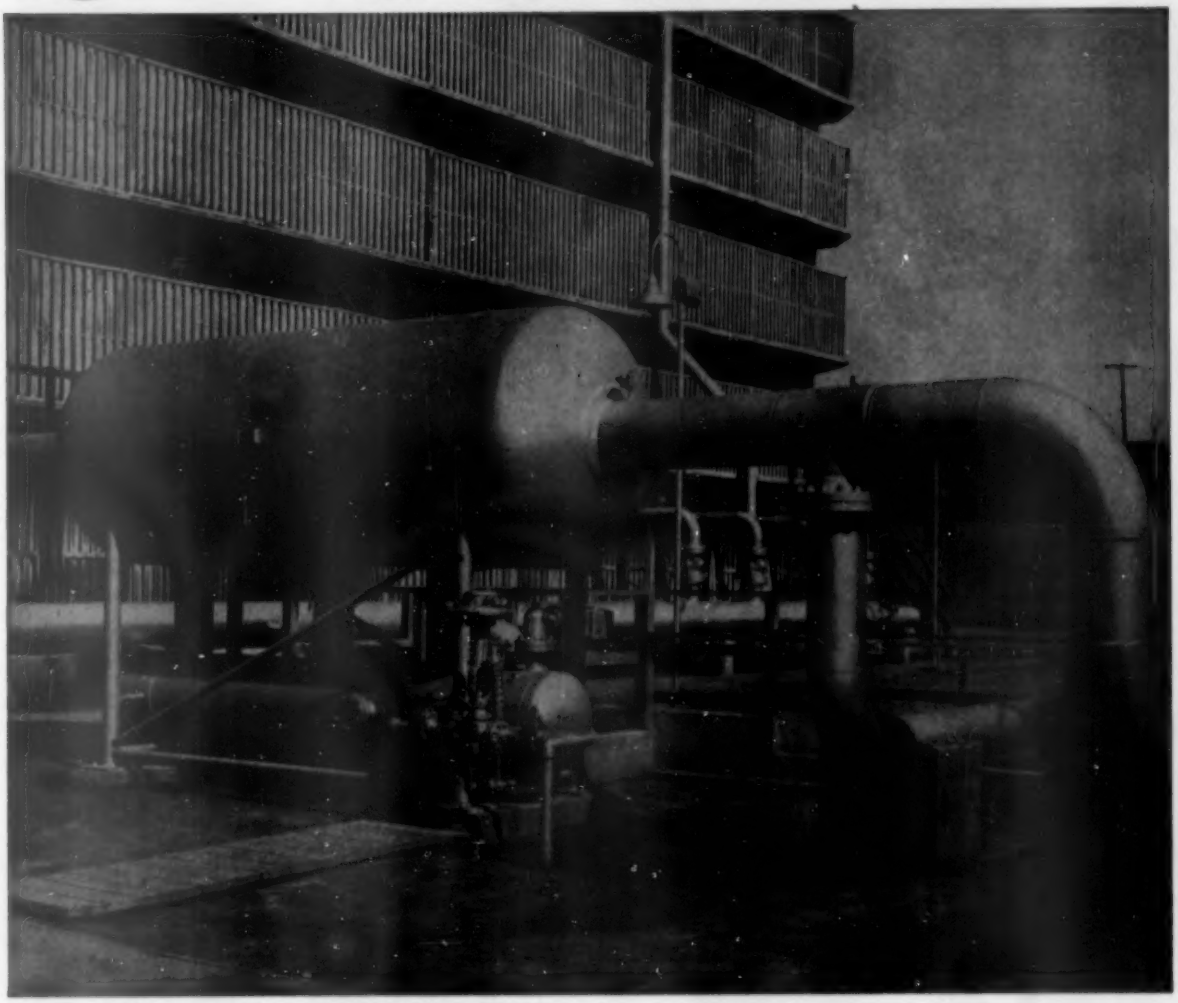
When your Waukesha Engines or Kohler Electric Plants and air cooled engines need professional attention, you are assured of quick, efficient repair service from Waukesha Sales and Service, Inc. Our 11 modern branches, located strategically throughout Texas, Louisiana and New Mexico, stock a full line of nationally known parts and maintain experienced, factory-trained mechanics who know how to keep your down-time at a minimum. Furthermore, this dependable service is at your call twenty-four hours a day to help you when you need it most.

Next time you need reliable service or parts, call us. Remember you are treated best at home . . . and we are **home** for Waukesha Engines and Kohler Electric Plants and air cooled engines.

WAUKESHA Sales & Service, Inc.

1422 MAURY STREET • HOUSTON, TEXAS

See PEERLESS FIRST!
For GAS SCRUBBERS...



The BEST SCRUBBERS for PIPELINES, GATHERING SYSTEMS, COMPRESSOR STATIONS, PLANT INLET SCRUBBERS

Pictured above is a Peerless 60" O.D. x 15 foot horizontal separator, handling 240,000,000 cu. ft. per day at 350#.

This separator is removing condensed liquid from the cooling tower to prevent moisture accumulation in distribution units.

Consult Peerless for an engineered solution to your most stringent entrainment problems.

PEERLESS MFG. CO.

PEERLESS MANUFACTURING CO.

P. O. BOX 13165 ★ DALLAS, TEXAS ★ DIxon-8431

REPRESENTATIVES IN ALL PRINCIPAL CITIES

AVAILABLE JOHNSTON by AL CAPP

YO' JOHNSTONS WINS TH' SAFETY AWARD, AGIN!!-YO' TESTED MORE WELLS THAN ANYBODY!!
NATCHERLY!!-US JOHNSTONS SPESHULIZES IN DRILL-STEM TESTIN', WIF OUR SPESHUL EE-KWIP-MUNT!!
HE IS AVAILABLE, AN' AH IS ACCURATE!
YO' GITS US BOTH, WHEN YO' CALLS JOHNSTON- ANYTIME- ANYWHAR!!
WE CUTS LOST DOWN-TIME TO A MINNY-MUM, MUM!!
WE IS LOSIN' TIME, NOW!!-TH' MOON'S UP!!
SORRY!!-US JOHNSTONS GOT NO TIME FO' NOTHIN' BUT OIL!!
Al Capp

C-542

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

CHEMICAL PROCESS NEWS

PUBLISHED BY CHEMICAL PROCESS DIVISION, THE M. W. KELLOGG COMPANY MAY-JUNE 1954

NOTES ON

CUMENE

Cumene jumped into prominence during the last war when it was needed in large quantities for its anti-knock properties in aviation gasoline. More recently, renewed interest has developed in the chemical as a starting point in the manufacture of phenol.

***

To supply the sudden wartime demand for cumene, Kellogg designed and built four plants which were outstanding producers. In addition to this and subsequent post-war experience, Kellogg is currently building another cumene plant for a U. S. chemicals manufacturer as part of complete facilities for producing phenol.

***

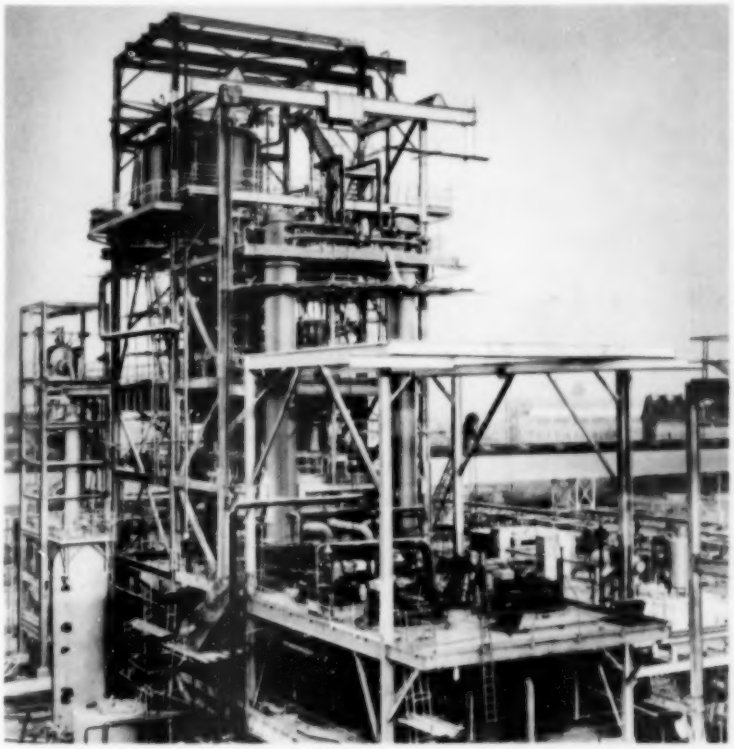
Heart of Kellogg's cumene process is a copper pyrophosphate catalyst developed in Kellogg's Jersey City, N. J. laboratory. Unique to the Kellogg process, and utilized in all of the plants the Company has built and is now building this catalyst gives the process two of its most important points of superiority —higher yields and a higher purity.

***

Copper pyrophosphate is extremely selective in the propylene-benzene reaction. Since it does not alkylate ethylene if present in the feed, high purity cumene required for phenol production can be obtained without removing ethylene from the feed or ethyl benzene from the final product, one of which steps would otherwise be required.

***

As an illustration of yield advantages, over-all conversion of benzene to cumene of other processes are described as falling in the range of 90 to 93%, based on benzene. By contrast, commercial data from Kellogg-built plants indicate yields ranging from 95 to 97% when copper pyrophosphate is emoloyed.



Lower Operating Costs, Better Yields In Fluid Phthalic Process

Two phthalic anhydride plants currently under construction in Europe highlight not only the growing importance of this chemical abroad, but also the economic attractiveness of Kellogg's Fluid process for manufacturing it.

One of the two plants which is shown in the photo above is nearing completion in England under the supervision of the Kellogg International Corporation. The other is being built for a major chemical manufacturer on the Continent. When completed, they will have a combined yearly production of more than 40 million pounds of phthalic anhydride. In both cases, the product is obtained by oxidizing naphthalene in the presence of a fluidized solid catalyst.

Kellogg's Fluid process offers a number of distinct advantages over conventional processes with fixed beds. The Fluid catalyst principle makes for improved temperature control and results in optimum operating conditions. The efficiency obtained allows the use of less air—in some cases as much as 50% less —and better heat recovery.

In addition, yields are up to 5–10% higher; the product is of greater purity: and large Fluid plants can be operated with no more personnel than are required for fixed bed units of considerably smaller capacity.

(SEE REVERSE SIDE)

New Ammonia Plant Now On Drawing Boards

Already past the chemical processing phase and well into mechanical design, Kellogg's latest anhydrous ammonia plant—this one for National Distillers Products Corporation—is now under construction at Tuscola, Illinois.

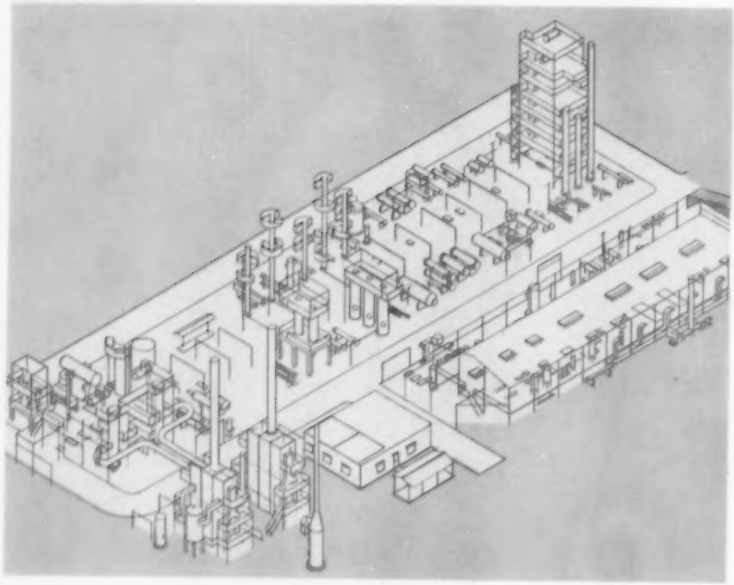
The synthesis is carried out in a step similar to that used in several previous ammonia plants built by Kellogg, the latest of which went into production a few months ago on the West Coast.

Initial operation at this West Coast plant has been more than satisfactory, demonstrating the high efficiency of Kellogg's unique quench type ammonia converter. Design guarantees have been exceeded, catalyst efficiency—even discounting the "youth" of the catalyst—has proved superior, and the product has been 99.9% pure.

Optimum Temperature Control

The Kellogg converter is designed to operate at intermediate pressures. An unusual design feature is provision for injecting quench between the catalyst beds for optimum control of temperature. Since the catalyzed hydrogen-nitrogen reaction requires a special temperature gradient for maximum conversion and since the reaction is carried out at temperatures near those at which the catalyst deteriorates rapidly, close control of temperature throughout the catalyst beds is a critical factor. Kellogg's design closely approaches the ideal arrangement for controlling the removal of heat from the converter.

The operating conditions provided—optimum reactor pressure and elimination of localized hot-spot temperatures—give the Kellogg converter its major process advantage of higher conversion per pass because reaction conditions are more favorable. At the same time these operating conditions are obtained in a converter of simplified mechanical design, resulting in reduced capital investment.



Another Ethylene-From-Petroleum Plant Gets Underway In Europe

Shown above is an isometric drawing of the pyrolysis and recovery sections of a large ethylene plant Kellogg is now building for an important European chemical manufacturer.

Demonstrating a trend abroad, this will be the second European plant to incorporate Kellogg's unique pyrolysis process for producing ethylene and other olefins. In view of decreased fuel oil demands and a sky-rocketing demand for ethylene domestically, this process is becoming increasingly attractive in the U. S. as well.

Not shown in the drawing above is the feed preparation unit which will distill the feed stock (heavy naphtha and gas oil) from crude. These fractions are then cracked in the presence of steam in pyrolysis furnaces specially designed to suppress coking—the big "bug" in conventional systems for making ethylene. Following cracking, the product stream is separated and purified in a low-temperature, low-pressure fractionation system, which was another of Kellogg's developments.

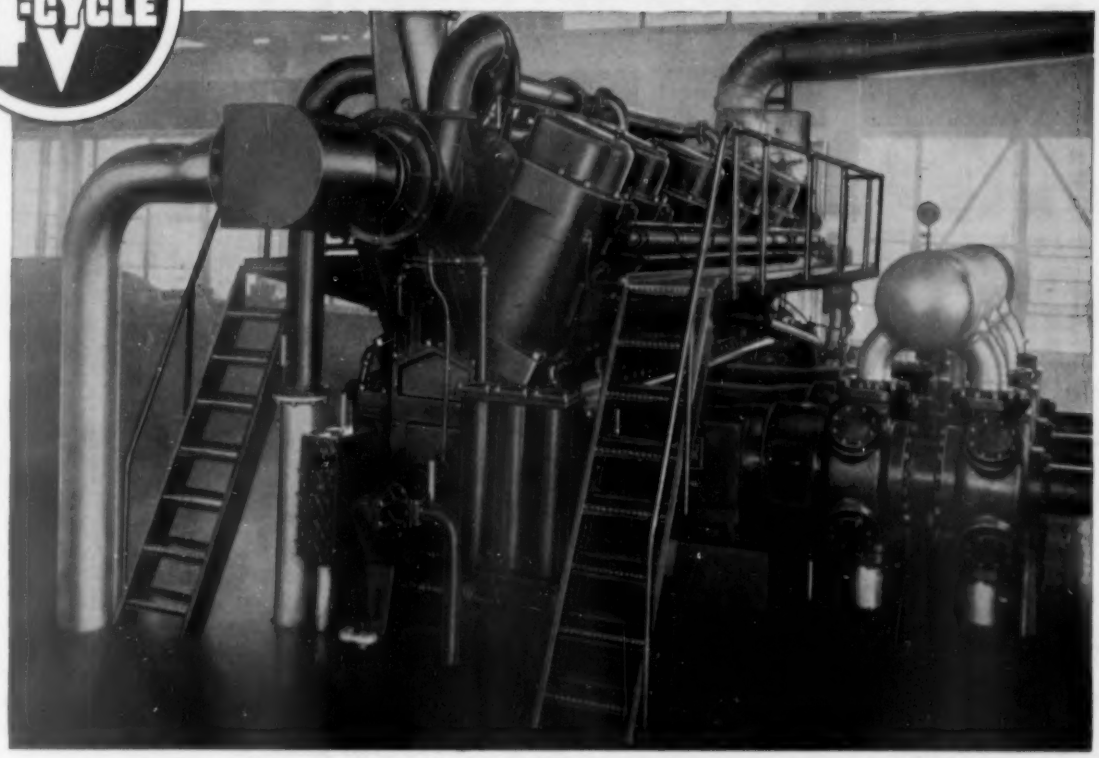
In addition to gas oil and naphtha cracking as embodied in the two European plants, the first of which has been in successful operation for more than two years, Kellogg has extended its design to include pyrolysis of ethane and propane feeds. Studies are currently underway on various heavier feedstocks.

For further information, technical data, etc., relating to chemical or petrochemical processing, write

CHEMICAL PROCESS DIVISION
THE
M. W. KELLOGG
COMPANY
225 Broadway, New York 7, N. Y.
also Jersey City, Buffalo, Chicago, Los Angeles, Tulsa, Houston
In Canada—Toronto and Edmonton
In Europe—London and Paris
KELLOGG PULLMAN

TURBOCHARGED

4-CYCLE V



Here's the first installation of a TURBOCHARGED gas-engine-driven compressor. This Ingersoll-Rand KVS unit went on stream early in 1952. Its performance has lived up to every expectation.

The FIRST TURBOCHARGED gas-engine-driven compressor!

...2000 hp, 4 cycle

...developed through TEN YEARS of experimentation on FOUR full-sized engines

...shop and field tested for THREE YEARS

...service proved for more than a year

...a large number of production units now being built and installed

In the new TURBOCHARGED "KVS" engine, waste energy from the exhaust provides power for scavenging and supercharging, through two gas-turbine-driven centrifugal blowers, one at each end of the machine. The result—a new high in efficiency and economy! Note these outstanding advantages:

MORE POWER IN LESS SPACE
LOWER FUEL CONSUMPTION
COOLER RUNNING
LOW HEAT REJECTION
NO AIR COOLING
ECONOMICAL COOLING SYSTEM
EASY STARTING
FOUR COMPRESSION CYLINDERS
ULTRA CONSERVATIVE RATING

Features such as these make the new KVS an important advance in the design of Ingersoll-Rand's traditionally dependable V-angle, 4-cycle gas engine. Ask your I-R representative for the complete story.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

69

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO-BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL & GAS ENGINES

NEW FORD "317" CU. IN. ENGINE

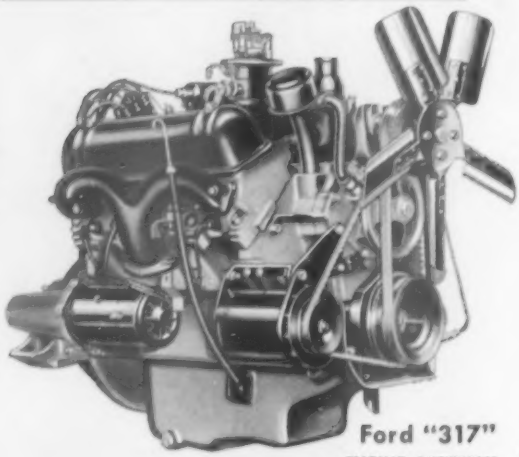
V-8 CYLINDER HEAVY DUTY

- ★ ULTRA-MODERN DESIGN
- ★ GAS-SAVING LOW FRICTION
- ★ OVERHEAD VALVE
- ★ HIGH COMPRESSION
- ★ LARGE BORE
- ★ SHORT STROKE
- ★ DEEP RIGID BLOCK

Designed especially for dependable, economical INDUSTRIAL SERVICE

This folder is available fully describing the new Ford "317" Industrial Engine, including detailed specifications, horsepower and torque curves, dimensional drawings, etc. Send for your copy now.

The Most Efficient Industrial Engine in its Class!



Ford "317" ENGINE ASSEMBLY

The new Ford "317" V-8 Industrial Engine offers *superior efficiency*, with completely modern features that equipment manufacturers, their designers and engineers will recognize as far ahead in the field of internal combustion gasoline engines:

- ★ **Short stroke, low-friction design to reduce internal friction and heat losses for *more usable power* from *less gas* and with *less engine wear!***
- ★ **Large bore permits greater diameter overhead intake and exhaust valves of free-turning design with integral guides, for higher breathing efficiency and longer valve life.**
- ★ **Compact, wedge-shaped combustion chambers for high turbulence, lower energy loss, more power from displacement size.**
- ★ **Built-in full-flow oil filtration for 100% protection of all bearings and prolonged engine life.**
- ★ **Outstanding structural rigidity with deep-skirt crankcase for 240° bearing support, wide-base flywheel housing connection and short, large diameter, fully-counterbalanced crankshaft for superior resistance to vibration.**

These and many other progressive design details result in an industrial engine that's tops in gas-saving power—developing high torque per cu. in.—compared with other make engines of this size.

Ford Sales Engineers are always glad to discuss your particular power problems and extend every possible help in solving them. You have merely to phone or write to—

INDUSTRIAL ENGINE DEPARTMENT

FORD MOTOR COMPANY

15050 Woodward Avenue, Highland Park 3, Michigan

Ford

INDUSTRIAL ENGINES AND POWER UNITS

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

PUMP STRIPPER WELLS MORE PROFITABLY-

WITH *Carter* LONG-STROKE HYDRAULIC PUMPING UNITS

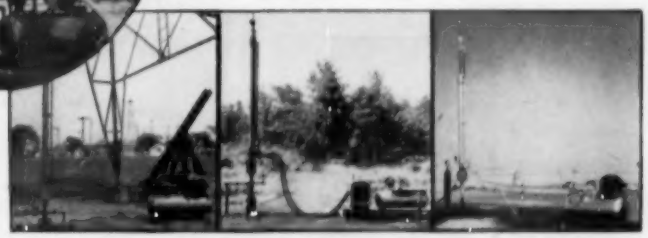
designed-built-priced **FOR STRIPPER WELLS**

SOUTH TEXAS: Production increased from 3½ bbl./day to 6 bbl./day on 2700' well in Duval County Area when Carter Unit replaced conventional equipment. Shown is one of 11 units owned by independent.

Actual records show that in many cases installation of *Carter Units has caused substantial production increases.* Long, slow upstroke and fast downstroke of Carter Units permit pumping at *nearly constant flow and with greatly improved overall efficiency.*

Some of the Specific advantages Carter Pumping offers you are: maximum production without pumping off or pounding fluid; accurate control of pumping rate; longer life of sucker rods and sub-surface equipment; reduction of costly down-time, better handling of gassy, sandy or viscous fluids; simplicity of operation and worthwhile savings in initial cost and installation.

With over 800 units now in service, some for as long as eight years, the Carter method is increasingly *recognized* by both majors and independents *as the better way to produce stripper wells.*



EAST TEXAS: One of 8 Carter Units owned by major in Kilgore-Turnertown Areas. Pumping allowable from 3500'. Total cost about 60% conventional unit cost.

OKLAHOMA: One of 7 Carter Units owned by independent in Tulsa Area, pumping from about 1500'. Operator reports production holding better than offsetting wells with conventional units.

WEST TEXAS: Carter Unit in Spraberry Area pumping from 7080'. Unit was installed for about 30% conventional unit cost.

Available in Seven Models to suit your specific requirements.

WRITE FOR BULLETIN PR-253

S. C. CARTER CO., INC.

1900 Santa Fe Avenue, Los Angeles, California

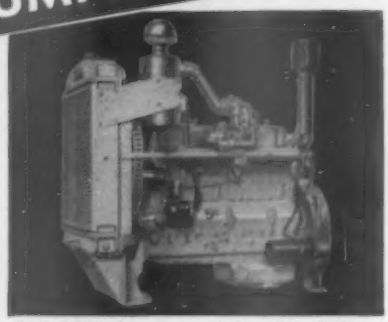
Sales and Service Representatives in: CALIFORNIA — Los Angeles, ILLINOIS — Robinson, Salem, INDIANA — Princeton, Evansville, KANSAS — Chase, El Dorado, Great Bend, KENTUCKY — Irvine, Oil Springs, Owensboro, LOUISIANA — Harvey, Houma, Lake Charles, New Iberia, Shreveport, MICHIGAN — Mt. Pleasant, MONTANA — Conrad, Cut Bank, OHIO — Wooster, Zanesville, OKLAHOMA — Healdton, TEXAS — Alice, Barbers Hill, Bay City, Beaumont, Borger, Columbus, Corpus Christi, Houston, Kilgore, Liberty, Monahans, Pampa, Victoria, WEST VIRGINIA — Vienna, WYOMING — Casper.

Export: Edmonton — Caracas — Maracaibo — Puerto La Cruz — Port of Spain.

WAUKESHA

the World's Finest Oil Field Power

PUMPING



148-GZSU Gas Power Unit—six cylinders, 5⅜-in. bore x 6-in. stroke, 817 cu. in. displ., 176 hp at 2000 rpm on natural gas.

DRILLING

LRDBSU Turbocharged Diesel Unit—six cylinders, 8½-in. bore x 8½-in. stroke, 2894 cu. in. displ., 500 hp at 1200 rpm, max.

Send for

BULLETIN 1079

It gives complete line of Waukesha Oil Field Engines for gas, gasoline, normal Diesel, or turbocharged Diesel operation—to 570 hp.

•

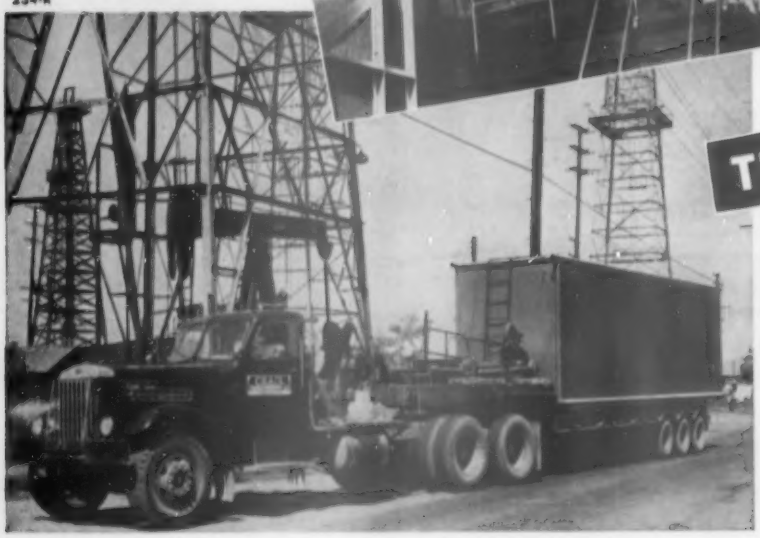
WAUKESHA MOTOR COMPANY

WAUKESHA, WISCONSIN

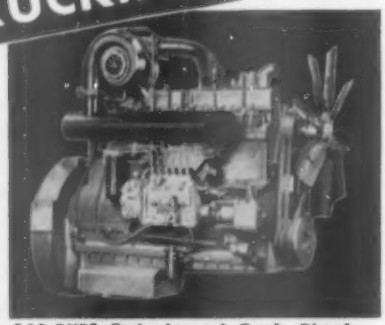
New York • Tulsa

Los Angeles

234-R



TRUCKING



148-DKBS Turbocharged Truck Diesel—six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displ., 280 hp at 2100 rpm.

"tough joint"

Pipeline construction does not stop for snow or cold weather. It's a year-round job these days. Under tough conditions, the welders above are fusing the metal to make a perfect joint of two sections of pipe.

Barrett Coal-Tar Protective Coatings are also designed to "take it." Along with the welds they have to have that same sure fusion that means top protection through every kind of terrain, winter and summer. It's an amazing fact that these Barrett coatings will actually prolong the life of steel pipelines indefinitely, while increasing the cost by only a small fraction. And when you specify Barrett you not only get the finest in protective coatings, but expert technical assistance as well.

The Barrett Technical Service Group, composed of experts in their field, help you pick the best protective coating to meet exacting specifications and yet keep costs to a minimum. In the field, Barrett Service Representatives go right along on the job—checking, advising, assisting in the preparation of pipe and the application of coating.

We welcome the opportunity to place the expert Barrett Technical Service Group at *your* service. For detailed information—phone, write, wire Barrett.

Approved Barrett Applicators are available for field or special work throughout the country. BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector St., New York 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, Que.

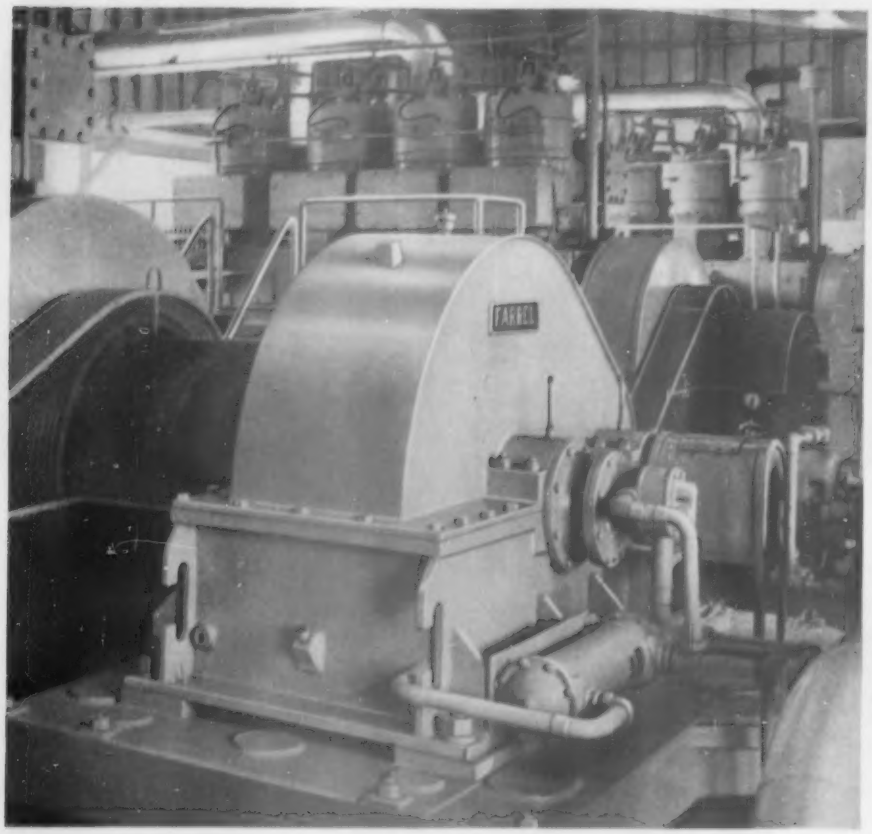
100 YEARS OF EXPERIENCE

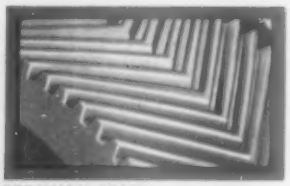
1854 1954

CENTENNIAL Barrett 100 YEARS OF EXPERIENCE

BARRETT PROTECTIVE COATINGS

Farrel speed increasers give you smooth power transmission year after year . . . here's why

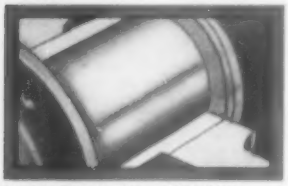




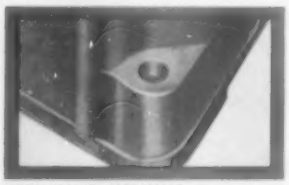
PRECISION GEARS
Herringbone gears generated with extreme precision by the Farrel-Sykes process.

A "FOUNTAIN OF YOUTH"
Completely self-contained circulating system furnishes pressure lubrication to all bearings, and spray lubrication to gears.

PRECISION-GROUND SHAFTS
Extra large for the power to be transmitted. Give added stiffness against bending and torsional deflections.



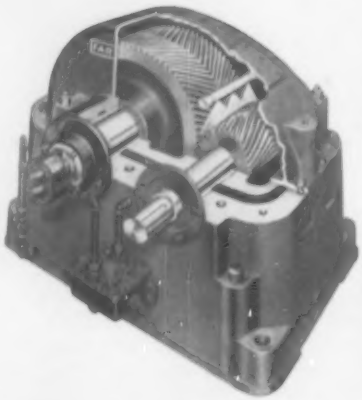
OVERSIZE SLEEVE BEARINGS
With consequent low unit pressures. Precision finished to extremely close tolerances.



VERY RIGID HOUSING
Holds rotating elements in original alignment, insuring maintenance of operating smoothness of gearing.

Since 1932, Farrel has worked closely with the oil industry to design speed increasers which will deliver power smoothly, year after year, meeting the unusual as well as the usual requirements of pipeline pumping service.

The standard line consists of 49 sizes with speed ratios ranging from 1:1 to 12:1. For higher ratios, double step-up units are supplied with ratio range from 12:1 to 40:1. For details of these proved-on-the-job speed increasers, send for a copy of bulletin 448A.



Farrel speed increasers in operation, including those originally furnished twenty-two years ago, now total over a quarter of a million horsepower.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

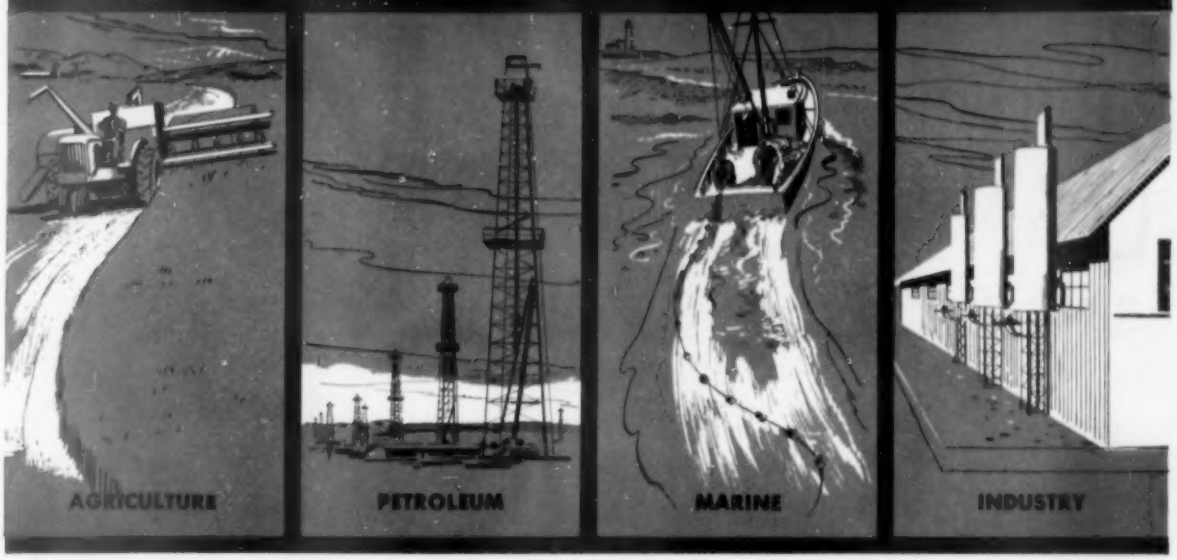
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans.

OIL FIELD REPRESENTATIVES:
Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Oklahoma. V. W. Osborne, 860-A M & M Building, Houston 2, Texas

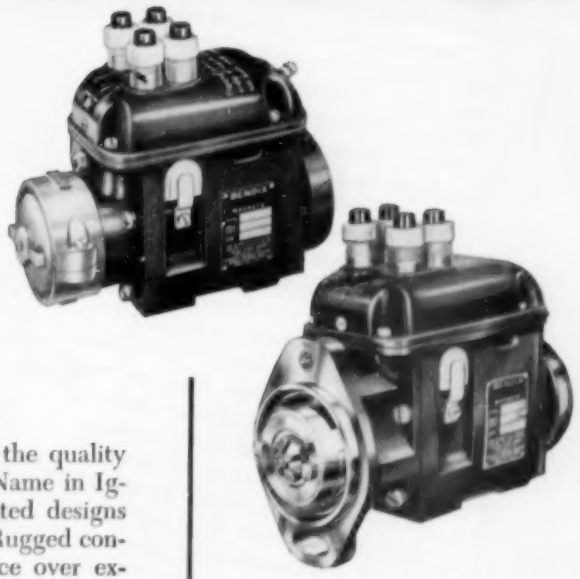
Farrel-Birmingham®

FB-924

For a **wide** variety of applications...



specify Bendix PA and PAF series magnetos



Here in the PA and PAF series magnetos, built to the quality standard that has made Bendix—The Most Trusted Name in Ignition—are a wide variety of base and flange mounted designs for agricultural, petroleum, marine or industrial use. Rugged construction throughout assures trouble-free performance over extended periods of time.

Detailed information available on request.

OUTSTANDING FEATURES: ***Aircraft Quality • Full Ball Bearing Weatherproof • Metal Distributor Cover • Shielded High Tension Outlets • Pivotless Aircraft-Type Breaker • Adjustable Lag and Lug Position • Unexcelled For High Speeds • Lower Maintenance Cost • These Features Assure Long Trouble-Free Operation.***

SCINTILLA DIVISION

OF

Bendix

AVIATION CORPORATION

SIDNEY, NEW YORK

Bendix

Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

FACTORY BRANCH OFFICES: 117 E. Providencia Ave., Burbank, Cal. • Brouwer Bldg., 176 W. Wisconsin Ave., Milwaukee, Wis. • Stephenson Bldg., 6560 Cass Ave., Detroit 2, Mich. • 512 West Ave., Jenkintown, Pa. • 8401 Cedar Springs Rd., Dallas 19, Tex. • American Bldg., 4 S. Main St., Dayton 2, Ohio

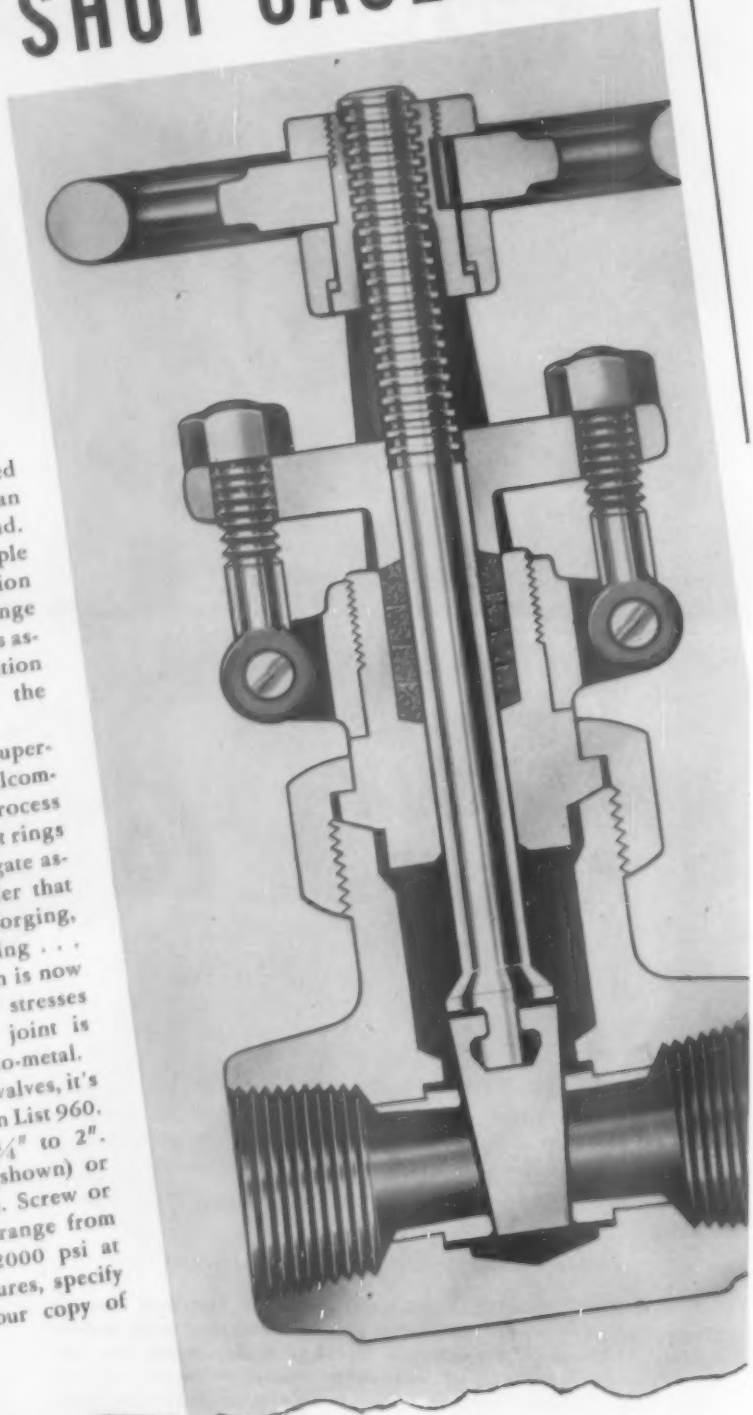
OPEN AND SHUT CASE FOR CHAPMAN LIST 960

Small Forged Steel Gate Valves

Chapman List 960 is used for more different jobs than any other valve of its kind. And no wonder: its simple and rugged construction means reliability over its wide range . . . super-hardened gate and seats assure tight closure, smooth operation and low maintenance under the toughest conditions.

Here's why: gate faces are super-hardened to 800 Brinell by Malcomizing, Chapman's exclusive process . . . hardened stainless steel seat rings are replaceable . . . stem-and-gate assembly has a tapered shoulder that seats snug in the bonnet forging, permits full-pressure repacking . . . the stem-and-gate connection is now 50% stronger where high stresses can develop . . . bonnet joint is gasketed or ground metal-to-metal.

For big savings on small valves, it's a winning case for Chapman List 960. Available in sizes from ¼" to 2". Rising stem, with yoke (shown) or inside screw, rising stem. Screw or welding ends. Pressure range from 380 psi at 1000°F to 2000 psi at 100°F. For higher pressures, specify List 990. Write for your copy of Catalog 10 now.



The **CHAPMAN VALVE**
MANUFACTURING COMPANY
Indian Orchard, Mass.

G-R fin-fan

more *than ever your best buy in*

AIR-COOLED HEAT EXCHANGERS

more *Applications*

The **fin-fan** exchanger is readily adaptable to practically every condensing and cooling application, particularly when the use of cooling water involves problems of supply, cost, scale or corrosion. Such flexibility is just one of many features, which make the G-R **fin-fan** your best investment in air-cooled apparatus.

more *Advantages*

Many important design and construction advantages are incorporated in the **fin-fan.** These include 100% effective cooling surfaces; maximum heat transfer afforded by exclusive G-R K-Fin Cooling Sections; fully prefabricated structure; predrilled supports, providing for addition of future units; *plus* bell-type fan ring for maximum efficiency with minimum horsepower required for fan.

more *Installations*

More square feet of K-Fin tubing, which forms the heat transfer surface, are being used in more types of air-cooled installations than any other design. Reason? Dependable ratings, design and workmanship backed by over 85 years of specialized experience in building quality heat transfer apparatus for varied services all over the world.

more

Dependable because completely G-R

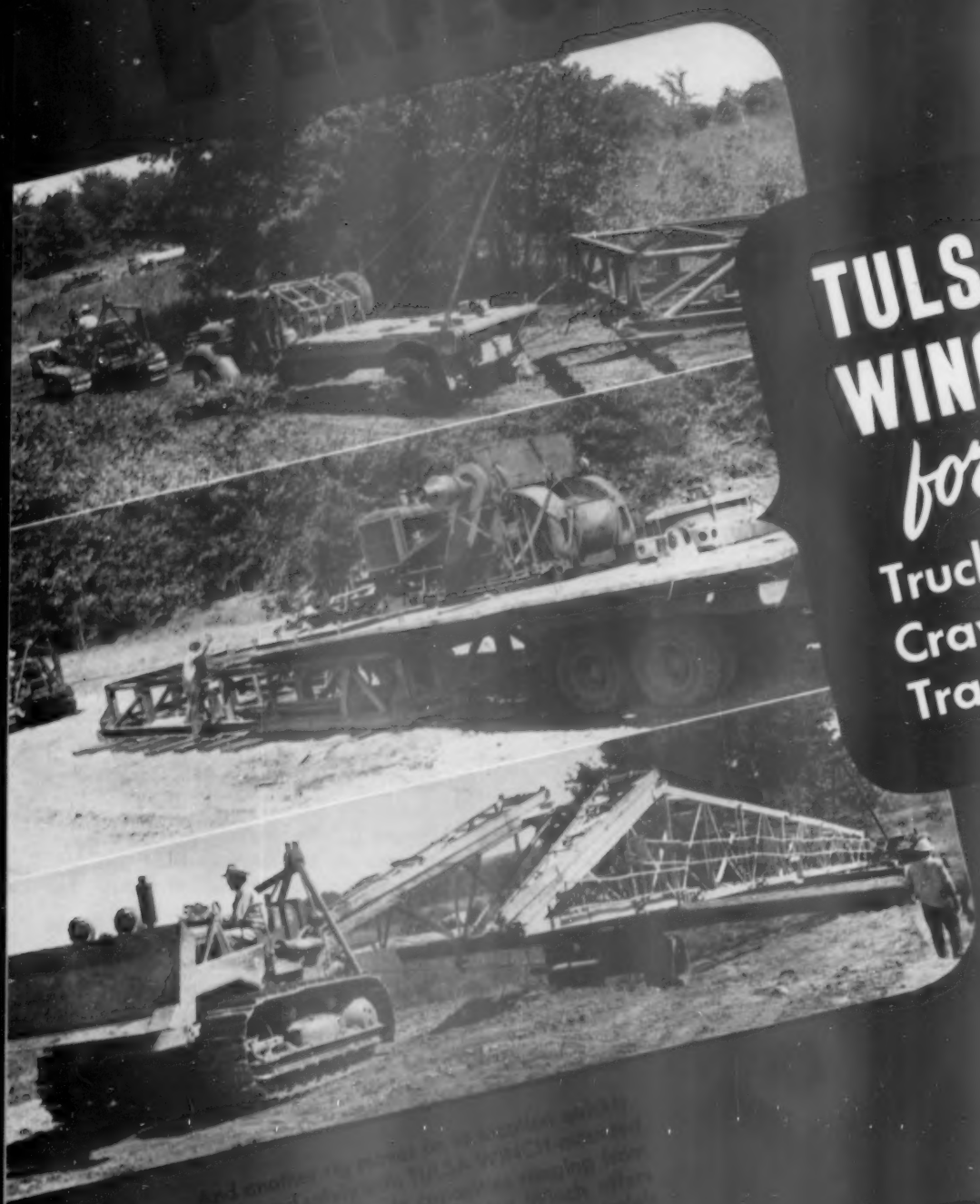
The new G-R **fin-fan,** *completely G-R,* can be depended upon for structural strength, peak operating efficiency, ease of installation, operation and maintenance. It is a complete self-sustained unit combining the best transfer service available with tested and proved air circulation equipment. As a result of exhaustive tests conducted on the complete equipment over a six month period G-R can offer you *guaranteed performance* based on actual test data. This is just one more important reason why the new G-R **fin-fan** is your best buy in air-cooled heat exchangers.

GR321

THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS

fin-fan Air-Cooled Heat Exchanger



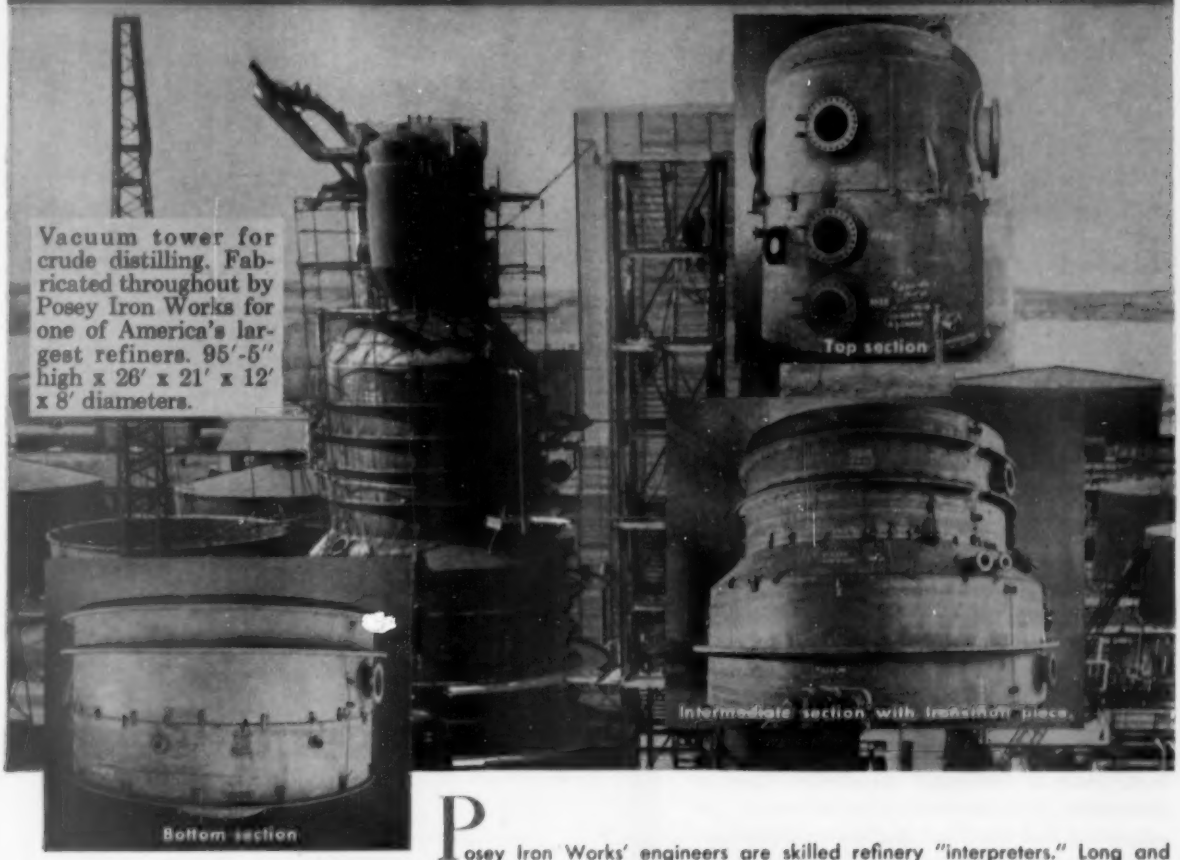
TULSA WINCHES *for*

Trucks and Crawler Tractors

Tulsa Winch
TULSA, OKLAHOMA
DIVISION OF VICKERS Inc.

SECTIONAL CONSTRUCTION:

Posey Knows It Inside and Out . . . and From the Oil Man's Viewpoint



Vacuum tower for crude distilling. Fabricated throughout by Posey Iron Works for one of America's largest refiners. 95'-5" high x 26' x 21' x 12' x 8' diameters.

Posey Iron Works' engineers are skilled refinery "interpreters." Long and practical service to the oil field has taught us to translate into *refinery* terms such factors of steel plate fabrication as sectional construction . . . loads . . . pressures . . . capacities . . . fire protection requirements . . . steels . . . alloys . . . and specialized structures.

All Posey Iron tanks and vessels are tested to a considerable excess over working pressures. Products are designed and built to comply with the requirements of the ASME; API-ASME; API and other codes. The Posey Iron Works is authorized to apply the appropriate code symbols.

Talk over your steel and alloy steel plate fabrication needs with Posey Iron. You'll find we talk your language.

POSEY IRON WORKS, INC.

Steel Plate Division

LANCASTER, PA.

New York Office: Graybar Building

ESTABLISHED SINCE 1910

DIVISIONS
Brick Machinery
Foundry
Industrial Heating
Ironsmith
Shipbuilding
Steel Plate

There's more to instrumentation than instruments

Instruments can do wonders, if they're given the chance. But some one has to put them to work in the most effective way. And that's where Honeywell Application Engineering steps in.

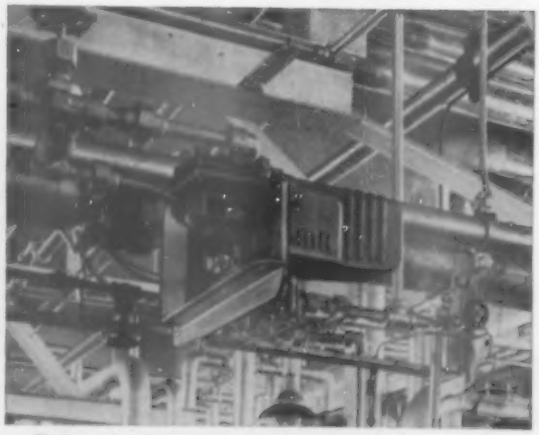
This service is one of the most important plus values you get in Honeywell instrumentation. It's a teamwork job. And every member of the team is an expert in his own field. Engineering begins right in your own plant, where a Honeywell field man digs out the vital facts about your process. He sits down with your engineers, production men and instrument technicians . . . and finds out everything he needs to know about what needs to be measured or controlled, to what accuracy, and under what conditions.

Then the problem goes to Honeywell's Application Engineering staff. Here's where you'll find groups of instrumentation specialists for every major industry. One group, for example, is devoted to the control problems of the metalworking industry. Another handles ceramic applications . . . another chemical . . . until together they cover the whole gamut of modern processes. These men know their specific field from years of first-hand experience. They're thoroughly familiar with the techniques of processing and the ways that instrumentation should be applied.

Honeywell Application Engineers develop detailed recommendations for the complete installation. They determine the most effective instruments, primary elements, types of control and valves for every phase of measurement and control. They add switches, signals, interlocks and other accessories which their experience indicates are needed in the interest of safety and convenience. Then they combine all components into a complete system—whether it involves a single instrument or a whole panel—that is designed for peak production efficiency, simple maintenance, and greatest convenience to operators.

This service saves time by doing engineering work that would tie up your own staff for many hours. And it pays off in assuring the excellent performance of which Honeywell instruments are capable.

Complete Honeywell instrumentation *covers every need*



Differential Converter mounted on pipe transmits flow data to a remote recorder on the central control panel.

Honeywell instrument control panel for repressuring plant operated by Stanolind Oil & Gas Company at Elk Basin, Wyoming.

of field processing plants

PLANNING a field processing plant? You don't need to "shop around" for instrumentation for the specialized applications of this kind of unit . . . because the broad line of Honeywell instruments encompasses practically every measuring and controlling assignment. Of particular interest to gasoline plants are:

ElectroniK indicators, recorders and controllers . . . the standard of precision and dependability, these instruments can measure dozens of different variables. The selection includes circular chart and strip chart models, and the Precision Indicator for rapid checking of up to 48 separate temperature points.

Brown Thermometers and Pressure Gages . . . available in practically unlimited choice of ranges and with various forms of pneumatic control.

Flow Meters . . . evenly graduated type for accounting and square root scale type for control applications. Electronic integrator gives fast, accurate flow totalizing. Choice of electric and mechanical meter bodies.

Differential Converter . . . a rugged but sensitive pneumatic balance transmitter for remote measurements of flow, and differential pressure.

Working with these instruments is a full selection of primary elements, control valves and accessories . . . from which Honeywell specialists design custom-fitted systems for individual process requirements. And behind these products stands a nationwide service organization that is always ready to help you, wherever and whenever you need instrument service.

Your nearby Honeywell sales engineer will be glad to discuss your own process control application . . . and he's as near as your phone.

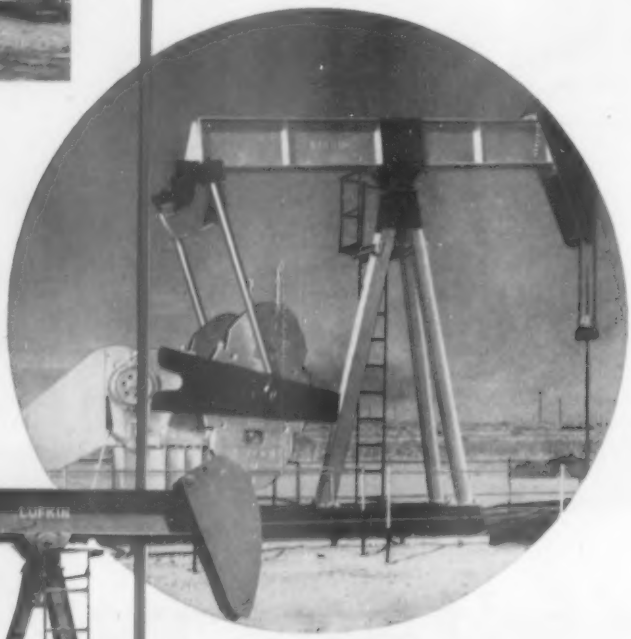
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

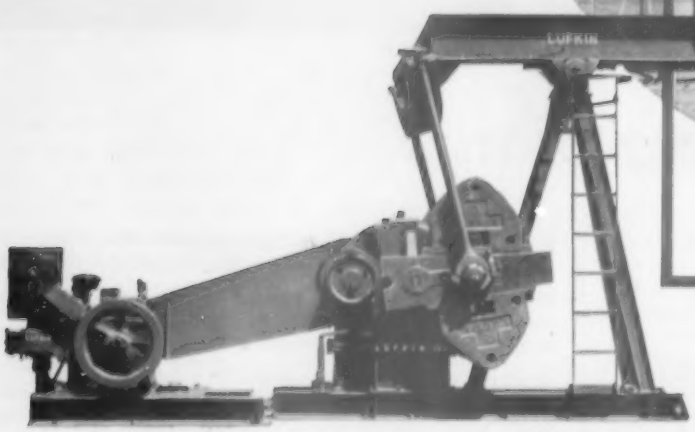
● **REFERENCE DATA: Write for Composite Catalog No. 5000.**

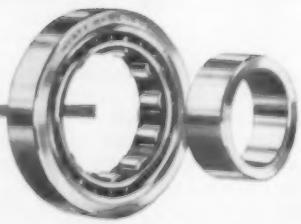
MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

They're LUFKINS and...

they're HYATT equipped!







Texas . . . California . . . South America . . . Canada . . . wherever Lufkin pumps operate, Hyatt Roller Bearings are on the job. In the gear box, for example, where only straight roller bearings will permit the end float necessary with herringbones, Lufkin uses Hyatt Hy-Loads almost exclusively. Hy-Loads last longer—especially under conditions of continuous operation—and they offer the additional advantages of easier assembly and maintenance and complete interchangeability of parts. To cut equipment costs, make sure *your* pumping units are Hyatt-equipped!

HYATT ROLLER BEARINGS

STRAIGHT ◯ BARREL ◯ TAPER ◯

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

Lay sour crude pipe with 62% less labor cost

Easy-handling Tenite pipe means substantial installation economies. In a typical case, three men laid 4000 feet of 4" Tenite pipe a day; eight men are usually required to handle the same amount of steel pipe.

Extruded of Tenite Butyrate plastic, the pipe does not corrode under oil-field conditions. Major oil producers are successfully using it for sour crudes, salt water disposal, and in areas where electrolytic action affects steel pipe.

The extra-smooth walls of Tenite pipe resist paraffin accumulation, minimize cleaning shutdowns. For any given head loss Tenite pipe also delivers approximately 40% more fluid than clean steel pipe of the same diameter.

Pipe extruded of Tenite is made by various companies to which Eastman supplies the plastic compound. Send the coupon for further information about Tenite plastic pipe. If you need assistance in adapting Tenite pipe to your operation, our technical staff will be glad to help.

For corrosion resistance ask for PIPE MADE OF—

TENITE
BUTYRATE
an Eastman plastic

•EASTMAN CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
Subsidiary of Eastman Kodak Company

EASTMAN CHEMICAL PRODUCTS, INC.
DEPT. 1, KINGSPORT, TENNESSEE

Please send me further information about TENITE BUTYRATE PIPE

NAME .....
TITLE .....
COMPANY .....
STREET .....
CITY ..... STATE .....
OGJ 5-54

IMPORTANT LINK IN MECHANICAL POWER TRANSMISSION is the Worthington QD* Sheave. Now used by all industry, the QD was developed by Worthington for the oil fields where tight shaft grip and quick detachability of sheaves is essential.
*Reg.U.S.Pat.Off.

How the oil fields taught industry a lesson

It's hard to think of a tougher proving ground for machinery than the oil fields. Heavy shock loads and corrosion really give machine parts a workout. Take sheaves, for example. They used to be a big problem to oil men.

If the sheave was tight enough on the shaft to absorb all the shock loads, it was usually hard to get off when clutch or pump repairs were necessary. And if the sheaves came off easily, chances are they weren't on tight enough to withstand the loads.

To solve this problem, Worthington designed and developed the first sheave with a tapered, split hub. It was easy to get on, easy to get off, yet gripped the shaft tightly. Today, 15 years later, Worthington's QD (Quick Detachable) is the most widely used sheave in the world — the accepted standard in industry as well as the oil fields.

Local Worthington QD distributors in all oil-field areas are stocked-up in most sizes and they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa and New Orleans.

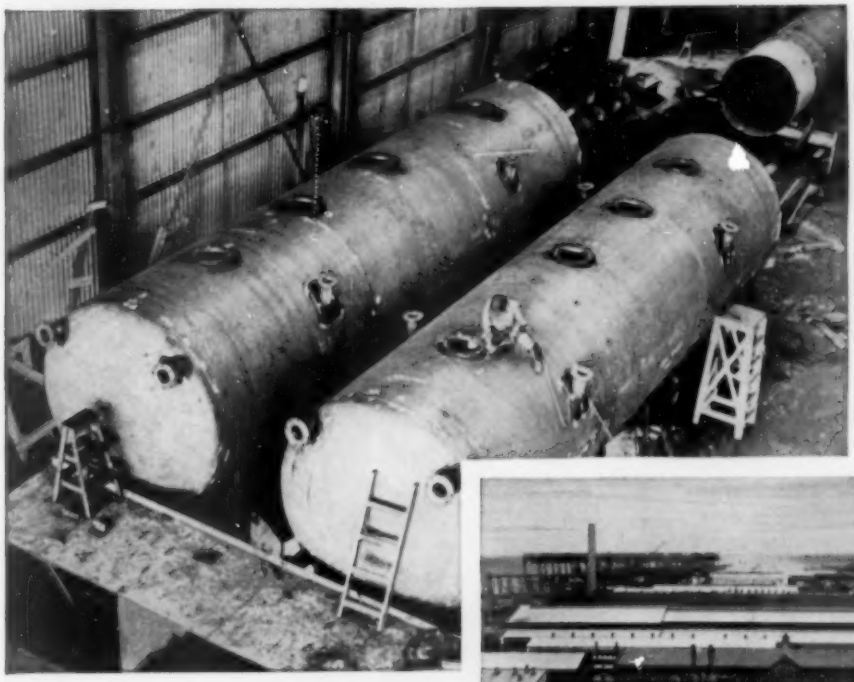
It'll pay you to STANDARDIZE on the Worthington QD. For more data, write for Bulletin V1400B7F to Worthington Corporation, Oil City, Pa.

MV.4.7

WORTHINGTON

BUY THESE WORTHINGTON STANDARD PRODUCTS FROM YOUR LOCAL DISTRIBUTOR

Compressors • Pumps • Multi-V-Drives • Variable Speed Drives



A Mile of Shops — Each shop is devoted to a special type of heavy production. Included are complete Machine Shops, casting, forging and other facilities which offer all of the advantages of the execution of the complete job.

A half mile of pressure vessels

These are two of seventy — over ½ mile — of 38½-foot vacuum tank casings built to meet the quality requirements of a well-known processor.

The buyer also benefits from many savings made possible by Newport News extensive heavy fabrication equipment and the sixty years experience in using it.

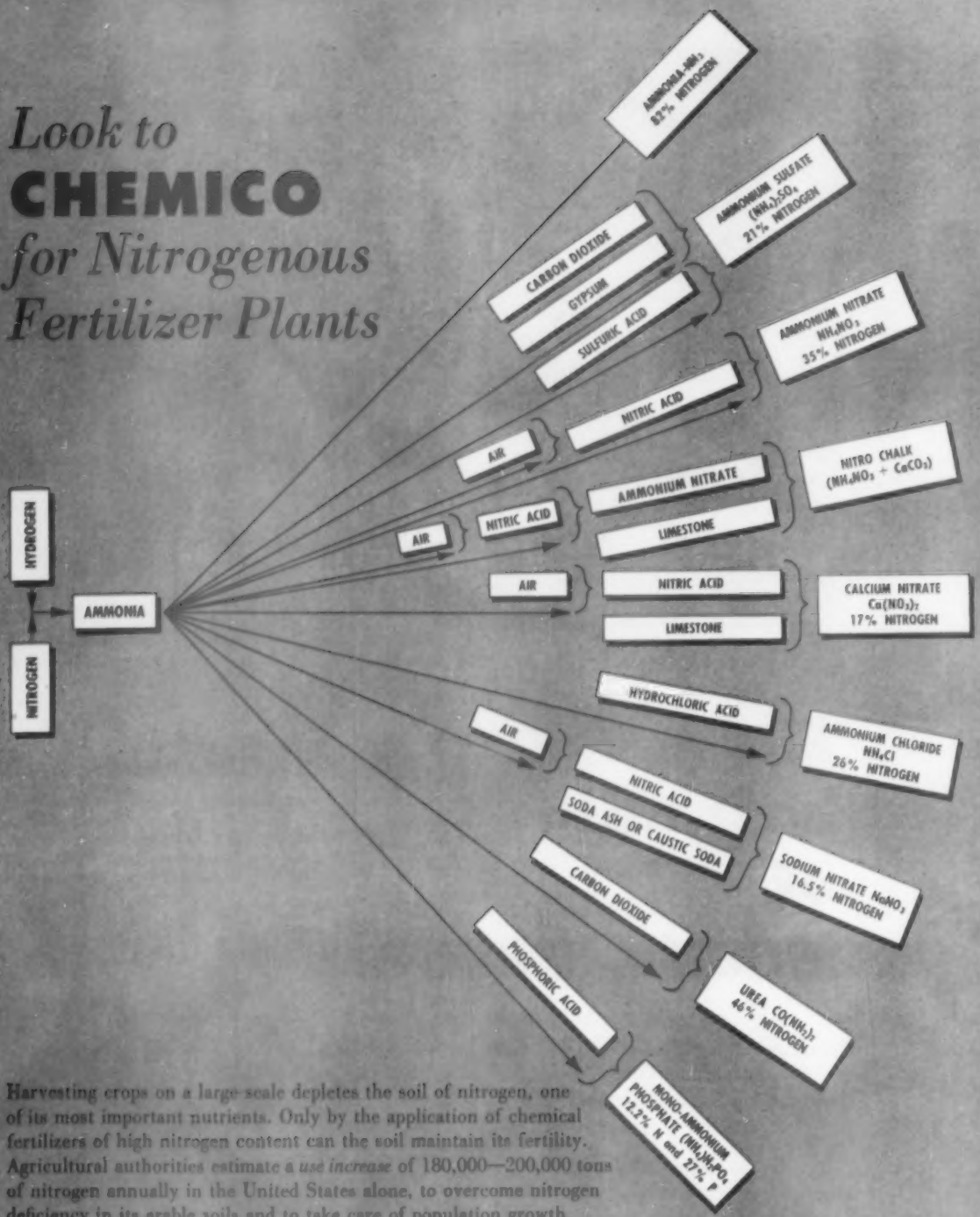
Do you plan installations of heavy production equipment? You can command the services of Newport News for weldments of corrosion-resistant, alloy and clad metals in almost any size or shape, plus the required engineering background and complete welding and stress-relieving skills.

It will pay you to get the facts, shown in *Facilities and Products.* As you glance at its photos and brief captions, you'll see why Newport News can turn out — at low cost — specialized heavy equipment for process plants.

Send for *Facilities and Products* — free — today.

Newport News
Shipbuilding and Dry Dock Company
Newport News, Virginia

Look to **CHEMICO** *for Nitrogenous Fertilizer Plants*



Harvesting crops on a large scale depletes the soil of nitrogen, one of its most important nutrients. Only by the application of chemical fertilizers of high nitrogen content can the soil maintain its fertility. Agricultural authorities estimate a *use increase* of 180,000—200,000 tons of nitrogen annually in the United States alone, to overcome nitrogen deficiency in its arable soils and to take care of population growth.

The Chemico organization is specially qualified to design and construct plants for the production of ammonia and nitrogenous fertilizers of all types. It offers a world-wide service backed by 40 years of experience.

NOTE: Formulae and percentages are on a theoretical basis. Fertilizers are produced in various grades.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVES: CYANAMID PRODUCTS LTD., LONDON • CHEMICAL CONSTRUCTION (INTER-AMERICAN) LTD., TORONTO • SOUTH AFRICAN CYANAMID (PTY) LTD., JOHANNESBURG

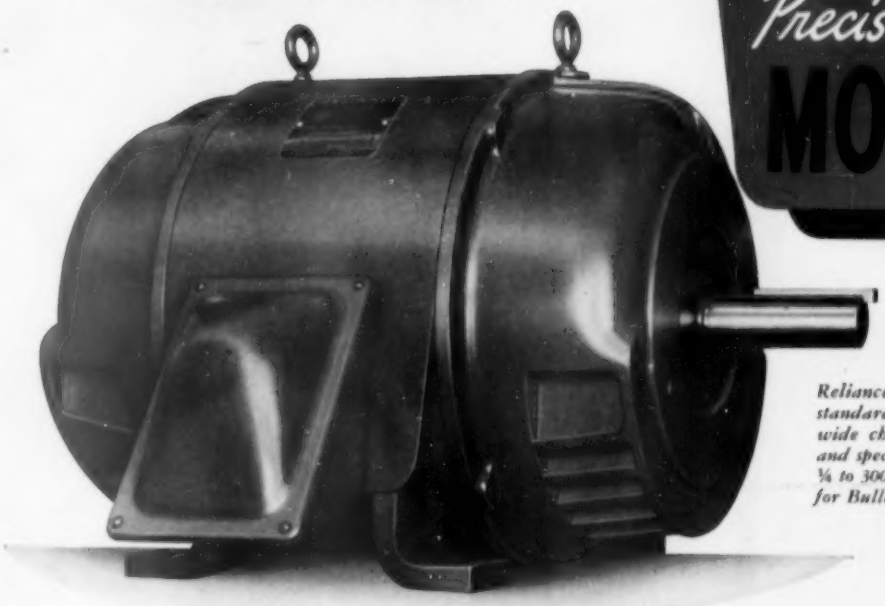
Chemico plants are profitable investments

CC-256

FOR COMPRESSOR SERVICE...

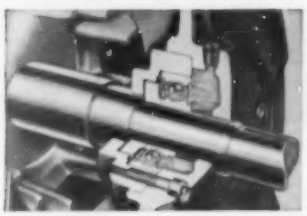
"All motors are NOT alike!"

RELIANCE *Precision-Built* **MOTORS**



Reliance Splashproof Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from ¼ to 300 hp. Get the full story—ask for Bulletin B-2101.

- ☆ Low starting currents... high starting torque ...liberal ratings
- ☆ Smooth acceleration... quiet operation
- ☆ Tough, vibration-proof Reli-X insulation



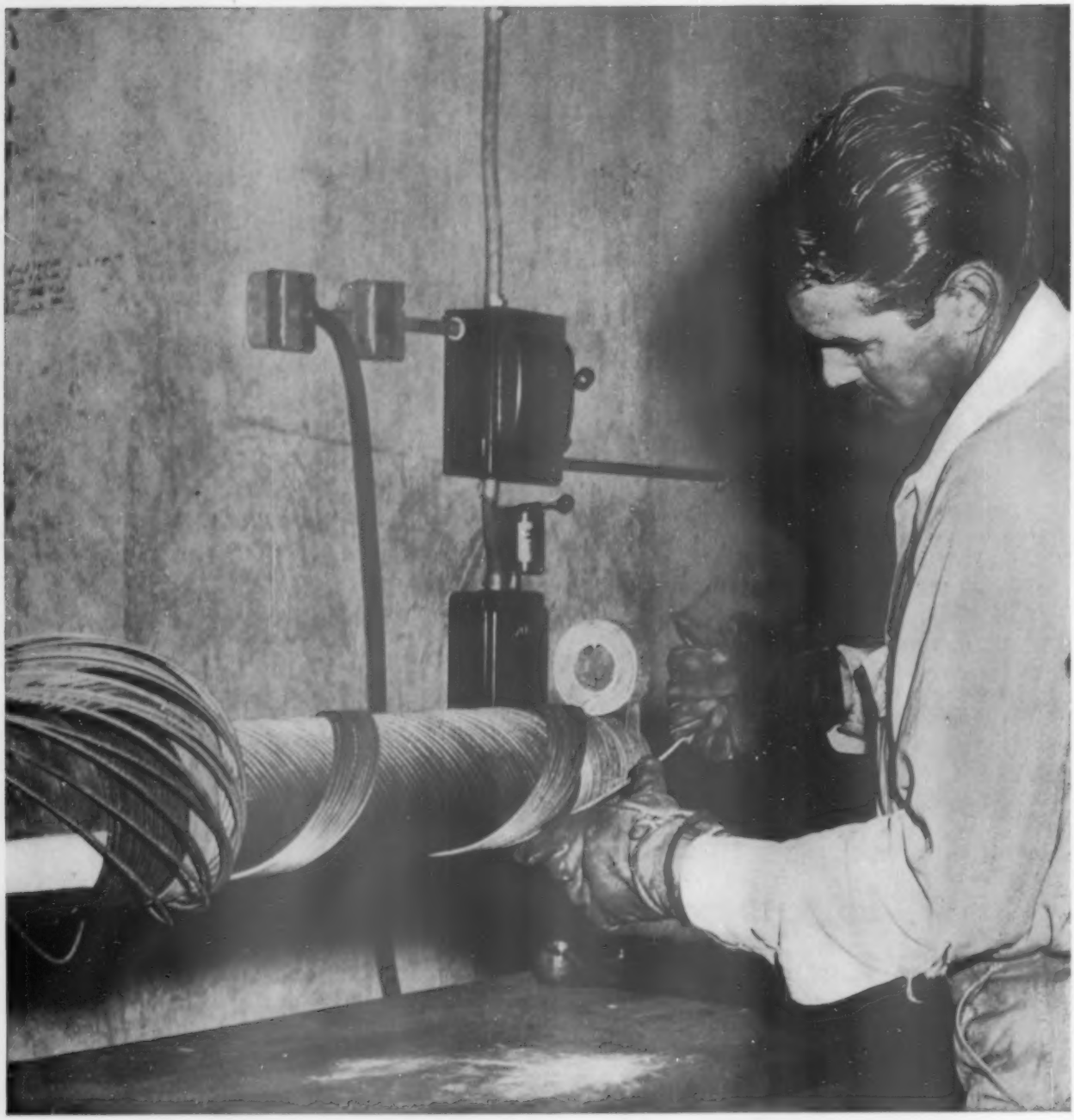
...AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1458C

RELIANCE ELECTRIC AND ENGINEERING CO.

1120 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

Now Available in Texas . . .



HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

Factory Rotary Hose Repair!

Hewitt-Robins Announces Complete Factory Coupling Resetting and Salvage Service for Hewitt-Robins Cable-Reinforced Rotary Hose

Now we can give you thousands of feet of additional rotary hose wear—save you time—save you money. For no longer do you have to scrap valuable lengths of Hewitt-Robins Cable Reinforced Rotary Drilling Hose because of wear or rupture.

Here are the facts: We are now equipped to repair your worn or damaged hose and reset it with new couplings at our new factory repair service facilities in Houston, Texas. When more than 30-foot lengths of hose can be salvaged, we rebuild it as rotary hose and reset new Stratoline couplings, the exclusive in-line couplings available only on Hewitt-Robins rotary hose. When less than 30-foot lengths can be salvaged, we repair and recouple the hose to provide one or more lengths of Rotary Flexible hose. All lengths are carefully tested to rigid factory specifications and promptly returned to you.

This new money-saving, time-saving salvage and repair service is available only to owners of Hewitt-Robins Cable-Reinforced Rotary Hose . . . Here is one more cost-cutting reason why it always pays to buy your rotary hose from your local Hewitt-Robins Oil Field Supply Distributor. It's the best hose that money can buy . . . and now it can be repaired to give you longer life and provide thousands more feet of economical drilling.

For information and service on Hewitt-Robins hose products contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Hose, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.

ROTARY DRILLING HOSE
FLEXIBLE VIBRATOR HOSE
MUD PUMP SUCTION HOSE
WATER SUCTION HOSE
WATER WASHDOWN HOSE
STEAM HOSE
SERVALL® (All-Purpose) HOSE
TWIN-WELD® HOSE

Hewitt-Robins Cable-Reinforced Rotary Drilling Hose is now available at these Oil Field Supply Outlets:

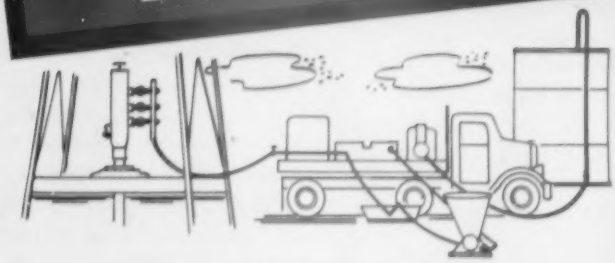
THE BETHLEHEM SUPPLY COMPANY of CALIFORNIA
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
STANDARD SUPPLY & HARDWARE COMPANY

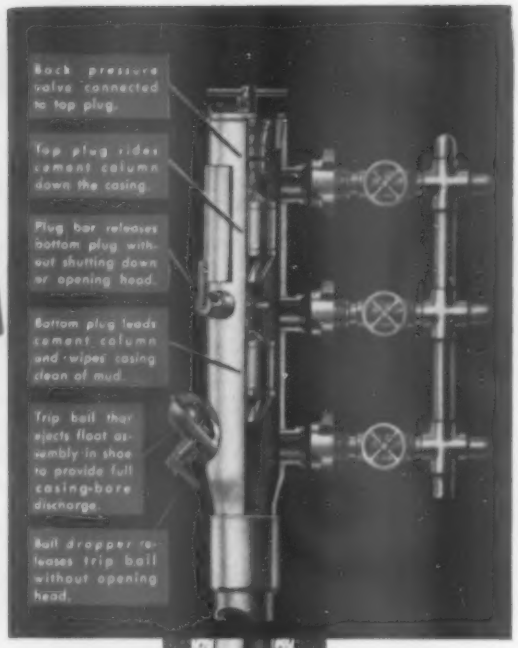
2539

INCORPORATED

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam
FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris France • Robins Conveyors (S. A.) Ltd., Johannesburg • **EXPORT DEPARTMENT:** New York City

From HEAD to SHOE




Back pressure valve connected to top plug.
Top plug rides cement column down the casing.
Plug bar releases bottom plug without shutting down or opening head.
Bottom plug leads cement column and wipes casing clean of mud.
Trip ball that ejects float assembly in shoe to provide full casing-bore discharge.
Ball dropper releases trip ball without opening head.

RECTOR FULBORE CEMENTING METHOD

Prevents Contamination of Cement

Hundreds of master cementing jobs by the Rector Fulbore Method prove the efficiency of its two plug method and the importance of its other exclusive features which are the basis of successful and satisfactory cementing jobs everytime. Ask your Rector Representative or authorized supply store for the complete story about better cementing with the Rector Fulbore Method.

PROTECTS AGAINST CONTAMINATION

The cement is completely and effectively segregated from well fluids by two closely fitting plugs which are positively and simply released at the proper time by mechanical means from outside the cementing head.

CLOSED CIRCUIT

Cementing head is never opened from the time cementing operations begin until they are completed. It is impossible for air pockets to form in either the mud or cement column.

FULL CASING DISCHARGE

Float assembly is pressure-ejected from the float shoe by the trip ball after casing string has been floated to position. This unrestricted opening reduces the load on the pumps . . . circulates greater volume with same pump pressure and results in higher velocity in space between casing and bottom of hole.

POSITIVE FLOW-BACK

When the back pressure valve, which has traveled down with the top plug, latches in the stall collar, it positively prevents flow-back of cement. Operator may bleed the pressure back to zero and leave the well open or close it in at final running pressure.

RECTOR WELL EQUIPMENT COMPANY INC

MAKING THE OIL INDUSTRY SAFER

3100 NORTH COMMERCE ST., FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

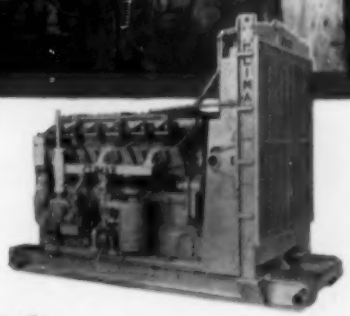
RECTORHEAD RECTOR FULBORE CEMENTING METHOD RECTORSEAL

ANOTHER POWER PROBLEM SOLVED

With Climax Blue Streak Engines

E. S. Hooker and A. F. Hatcher of Grey Wolf Drilling Company

Steady, reliable power really pays off in oil field operations. That's why Grey Wolf Drilling Company chose Climax Blue Streak Engines for their rig illustrated above. They know they can depend on Blue Streak's instant throttle response for fast hoisting. They know too, that year to year durability and economy under continuous heavy loads is a mighty important engine feature and the rugged design of Climax Engines provides top performance under every operating condition. Add to these outstanding engine qualities the fact that Climax Blue Streak Engines are designed to operate with equal efficiency on either Butane or Natural Gas and it's easy to understand why operators everywhere call Climax the number one name in engines. Climax Distributors are available for quick dependable service. Ask the one nearest you today for complete details about the Climax Blue Streak Engine best suited for your particular requirements.



climax BLUE STREAK ENGINES

CLIMAX ENGINE AND PUMP MFG. CO.

208 SO. LA SALLE ST. CHICAGO 4, ILL.

FACTORY
CLINTON, IOWA

DISTRICT OFFICE
155 CONTINENTAL AVE.
DALLAS 7, TEXAS

DISTRIBUTORS

Harry Cornelius Co.
Albuquerque, N. M.

Diesel Equipment Co.
Wichita & Great Bend, Kans.

Diesel Power Co.
Oklahoma City & Tulsa, Okla.

United Tool Co.
Shreveport, La.

Vern Walton Co.
Coolidge & Casa Grande, Ariz.

Wilson's Engine & Equipment Co.
Bakersfield & Long Beach, Calif.

Lewis Diesel Engine Co.
Memphis, Tenn., and
Little Rock, Ark.

Stewart & Stevenson Services, Inc.
Houston and 8 Texas Branches

Equipment Supply Co.
El Paso, Tex.

Diesel Power, Inc.
Plainview, Tex.

What does it take to build an "Oil Bank"?

LOANS

It takes money . . . big money to find and produce oil. Oil men know that the Republic is about the best place in Texas to get it.

LEASES

Leases are the beginning of the business end of 4,171,700 barrels a day of southwestern oil production. Financing the rest of the business of oil is what makes an "Oil Bank".

This is your Republic!

REPUBLIC NATIONAL BANK of Dallas

CAPITAL AND SURPLUS $50,000,000 LARGEST IN THE SOUTH

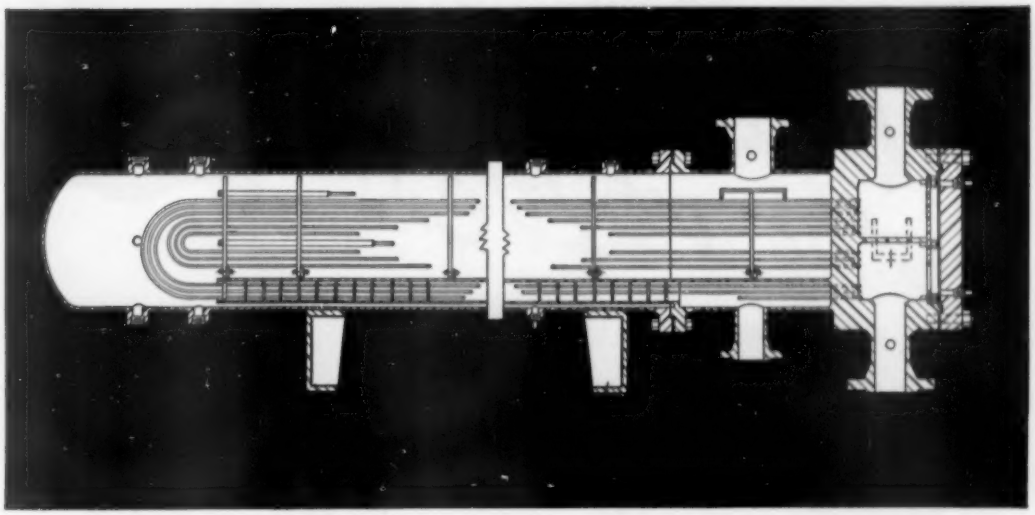
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

SUPERIOR FEEDWATER HEATERS

are BUILT to YOUR REQUIREMENTS

Superior's flexibility in the design of heads, shells, and tube bundles provides tailored units to meet every feedwater heating requirement. Any combination of desuperheating, condensing, or subcooling in a single heater.

Leak-proof pass partition sealing plates using pressure drop of feedwater to insure a positive seal. Controlled steam travel through heater by means of specially designed baffles minimizes tube erosion.



DESIGNED FOR MAXIMUM THERMAL EFFICIENCIES

The illustrated typical Superior feedwater heater incorporates the most modern features of design. The unit is one of a pair recently supplied a large user of feedwater heaters. The tube design pressure is 850 p.s.i.

The integral subcooling zone cools the drips to a temperature close to that of the incoming feedwater. This increases the thermal efficiency of the heater and reduces the flashing of the drips to the next lower heater, thereby minimizing the erosive effect on both the interconnecting piping and the tube bundle.

The pass partition plate in the head uses the pressure drop of the boiler feedwater through the tubes to prevent leakage between passes and thus increases the thermal efficiency.

Our Engineering Department invites your inquiry on any proposed application as a basis for a specific engineering recommendation. Write for catalog 6011.

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
HEAT EXCHANGERS

Vinson for valves

NORDSTROM VALVES

Ask for our Valve Inventory Bulletin. Save time and speed up delivery of needed valves by using the Vinson Valve Inventory. You can see at a glance, what valves we have in stock . . . your answer to quick procurement of hard-to-get valves. Call or write Vinson today and ask to be put on the Valve Inventory mailing list.

CRANE VALVES

Vinson's four warehouses carry Crane and Nordstrom valves in practically all sizes and pressure ratings for oil and industrial users in the Southwest. Crane valves are recognized leaders in the oil industry, and are stocked in iron, brass and steel—Nordstrom valves, the pioneer lubricated plug valves, are stocked in iron and steel.

OTHER VINSON LINES: Ladish Welding Fittings and Flanges • Fisher Controls • Chase Brass Tubes • National Pipe and Steel Tubes

GM DIESEL
CASE HISTORY No. 541-14

USER: O. D. Gaiser, Drilling Contractor, Bakersfield, California

INSTALLATION: Three GM "Twin" 6-71's drive Emsco GB 500 draw works through GM torque converters and Gardner-Denver FXK 7¼"x14" mud pump drilling to 9,000 feet.

PERFORMANCE: Mr. Gaiser reports quick acceleration of GM 2-cycle Diesels saves dead time on round trips. Has pulled 6,336 feet of 4½-inch pipe in 88-foot stands in 58 minutes. Engines on mud pump ran 2 years without overhaul. Also reports easier moves.

It pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL POWER

"Saves 'Dead Time' on Round Trips"

That's what drilling contractor O. D. Gaiser likes best about the GM Diesel power in his rig.

What do you want in *your* drilling rig?

Faster drilling? Quicker-acting General Motors 2-cycle Diesels speed drilling and pipe pulling because with power at every piston downstroke they respond faster to varying loads.

Quicker moves? There's more power packed into smaller, lighter GM Diesel engines. You tear down and set up faster—move without special road permits.

Flexible power? With GM Diesel "Twins" and "Quads" use only as much power as you need. Cut out one engine for servicing and you still have power to keep making hole.

Low cost? GM Diesels cost less to buy, less to run and less to maintain than other Diesels. And when parts are needed, they're readily available through a world-wide distributor organization.

Call your GM Diesel distributor. He'll be glad to show you how GM Diesel power "fills the bill."

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines...16 to 275 H.P. Multiple Units...Up to 840 H.P.

GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 PHILTOWER BLDG., TULSA, OKLAHOMA

CALIFORNIA—Bakersfield
LAWLESS BROTHERS, INC.
Berkeley
WEST COAST ENGINE & EQUIPMENT CO.
El Cajon
DEAKINS-LANE DIESEL CO.
Los Angeles
ANDERSON-O'BRIEN CO.
Ventura
GEM EQUIPMENT CO.

COLORADO—Denver
THE COLORADO BUILDERS' SUPPLY CO.

ILLINOIS—Mt. Carmel
WESTERN SERVICES

KANSAS—Great Bend
DIESEL EQUIPMENT CO., INC.
Wichita
DIESEL EQUIPMENT CO., INC.

LOUISIANA—Alexandria
UNITED TOOL CO.
Harvey
GEORGE ENGINE CO., INC.
Shreveport
UNITED TOOL CO.

MICHIGAN—Detroit
EARLE EQUIPMENT CO.
Grand Rapids
EARLE EQUIPMENT CO.

MISSISSIPPI—Jackson
TAYLOR MACHINERY CORP.

MISSOURI—St. Louis
WESTERN MACHINERY & ENGINE CO.

NEW MEXICO—Albuquerque
HARRY CORNELIUS CO.

NORTH DAKOTA—Williston
SWEENEY BROTHERS

OKLAHOMA—Oklahoma City
DIESEL POWER CO.
Tulsa
DIESEL POWER CO.

TEXAS—Corpus Christi—Dallas—Houston—Lubbock—Odessa—San Juan
STEWART & STEVENSON SERVICES, INC.
Plainview
DIESEL POWER, INC.

UTAH—Salt Lake City
CATE EQUIPMENT CO., INC.

WYOMING—North Casper
WESTERN OIL TOOL & MFG. CO., INC.

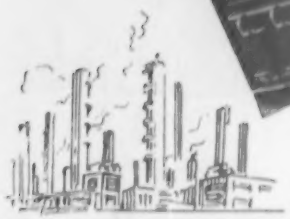
THIS 400,000 Pounds per HOUR

Vogt

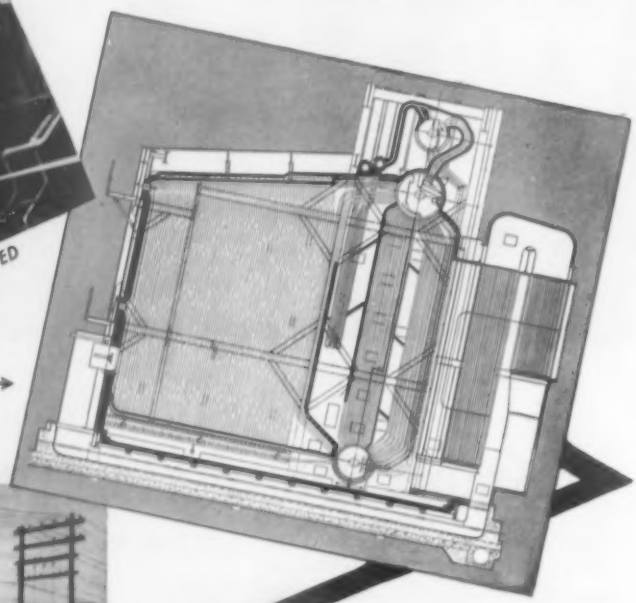
STEAM GENERATOR

Gives Top Performance in a Leading Texas Petroleum Refinery

VIEW OF THE COMPLETED STEAM GENERATOR



RIGHT →
LONGITUDINAL SECTION THROUGH THE UNIT.



6'-6" DIAMETER x 37'-0" LONG STEAM DRUM BEING TRANSPORTED TO THE ERECTION SITE DURING INSTALLATION.

PRINCIPAL DATA

400,000 pounds per hour capacity.

Fusion welded steam and water drums designed for 700 lbs. S.W.P.

Superheater delivers steam at 750°F. total temperature.

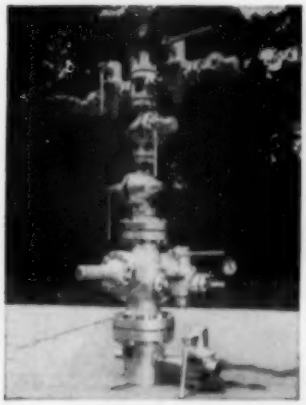
Water cooled furnace.

Burners for Oil and Acid Sludge fuel.

Vogt builds a complete line of bent tube steam generators designed to burn solid, liquid, or gaseous fuels to meet specific operating conditions. Write for bulletins.

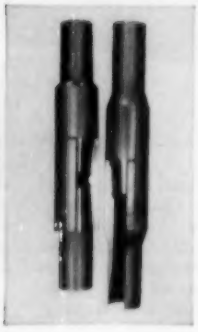
HENRY VOGT MACHINE CO., LOUISVILLE 10, KY.

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.



SHEFFIELD

Alloy Steel



Produced In A Full Range Of AISI Grades To Meet Virtually All Manufacturing Requirements

Tonnage-wise, Sheffield's steel producing capacity has been stepped up many times.

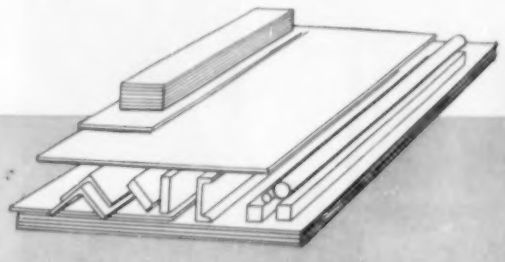
So has the range of grades in which Sheffield steels are made. These include the full range of standard AISI alloy steels. It is estimated that these meet up to 95% of requirements of manufacturers in the heavy hard goods field.

New annealing and heat treating facilities further widen the levels of strength, or hardness in which Sheffield alloy steels are supplied. Also the range of shapes and sizes is constantly being broadened for more varied engineering application.

In order to insure that their chemical and physical ranges fall within close limits, Sheffield alloys are electronically checked with a direct reading quantometer. It is capable of simultaneously determining the quantities of eight different alloy elements in a matter of minutes.

Pictured above are some of the products which manufacturers make from Sheffield alloy steel. Sheffield offers to all manufacturers, engineering and research organizations the services of its metallurgical and engineering staff in developing steels to fit individual and particular requirements.

Write or call your nearest mill or district sales office if you have steel problems involving strength, hardness and corrosion or abrasive resistance which alloys impart.



SHEFFIELD

STEEL

CORPORATION

HOUSTON KANSAS CITY

TULSA

SUBSIDIARY OF ARMCO STEEL CORPORATION

WHY C-H OIL WELL PUMPING CONTROL

is genuine Oil Country Control

Cutler-Hammer Program Time Switch gives automatically scheduled pumping, set up easily by means of pull tabs—one for each 15 minute interval.

There are no overstated claims about Cutler-Hammer Oil Country Pumping Control. To design and build it, we went to the oil country. We talked to oil men. We saw what was happening, because of heat, dirt, lightning, etc., what was lacking, what was needed.

Listen to this: Silver aluminum case finish to bounce the sun rays off. Ventilating openings top and bottom to create a chimney draft that carries heated air away. Contacts "out in the open" to radiate heat. Louvred, screened and baffled openings to shut out dust and dirt, and bugs. Vertical contacts to shed dust. Neoprene gasketed timer mechanism; an excess torque clock motor that "ticks" along even if dust gets in.

Three coil overload protection where single phasing is a problem; otherwise standard two-coil. Undervoltage relays for manual restarting; automatic "all-at-once" or staggered starting; or easy change from one to the other.

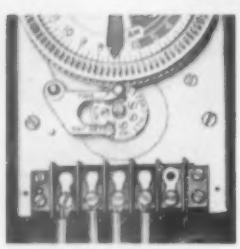
Easy on-off sequence changes, in 15 minute increments, giving you any sequence you want. Automatic day omission is optional.

Unit lightning arresters that tell you which one is blown—yet *don't* blow up the mechanism too.

These are just some of the features that make Cutler-Hammer the most popular control throughout the oil fields, from Pennsylvania to the Gulf and the Pacific. Try it once, you'll use it always.

CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

MEMBER AMERICAN PETROLEUM INSTITUTE

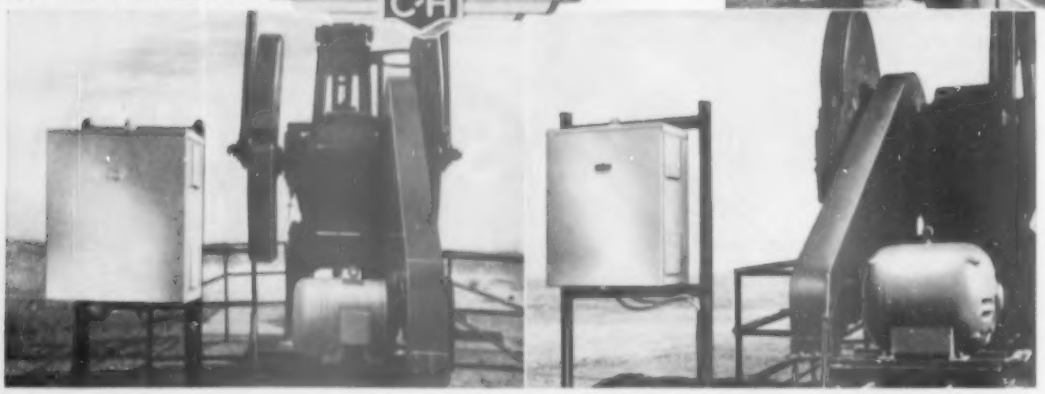


Cutler-Hammer 9589 Oil Well Pumping Controller with 3 coil overload protection and time delay relay.

Day-omission feature —for non-operation any selected days of week.

CUTLER-HAMMER MOTOR CONTROL C-H

Eunice, New Mexico



Carter County, Okla.

Scurry County, Texas

IF YOU DO, HERE'S A THOUGHT THAT MAY SAVE YOU MANY DOLLARS!

Some users of caustic soda who require the high concentration are accustomed to buying 50% NaOH liquor and then adding dry caustic to bring it up to needed strength.

Several of our customers have recently changed to buying the 73% concentration. They store and use it at full 73% strength. All have reported substantial savings on reduced volume cost and reduced man-hours.

If you are not specifying 73%, we believe it will pay you handsome dividends to investigate it.

Our technical staff will be happy to estimate the savings possible on any volume you may select. Just jot down in the block below a tonnage figure. Our engineers will figure out for you the cost of 73% liquor, vs. the cost of 50% liquor with the addition of dry caustic to bring it up to similar concentration.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DO IT NOW

Columbia-Southern Chemical Corporation
One Gateway Center, Pittsburgh 22, Pa.

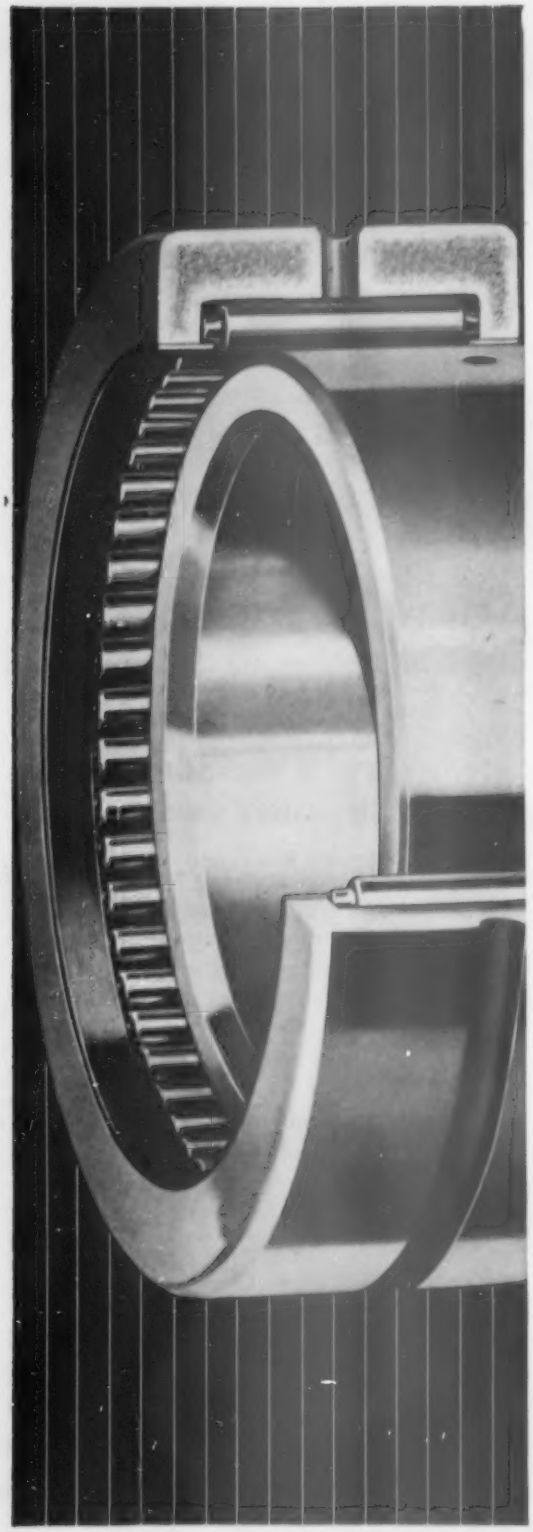
Gentlemen: For comparative purposes only, please estimate for me the cost equivalents of _____ tons of 73% caustic soda.

Name _____

Firm _____

Street _____

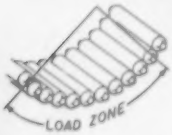
City _____ State _____



Here's why
TORRINGTON
Heavy Duty Needle Bearings
...give you top value for your bearing dollar

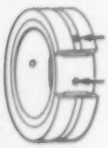
Carburizing grade nickel steel for both inner race and one-piece outer race gives harder, more wear-resistant surfaces, tougher, more shock-resistant cores.

Accurately ground raceway and side flange surfaces are sturdy and eliminate drag at roller contact, keep rollers in true path. No cage required.



Full complement of rollers of precision controlled diameters assures maximum load carrying capacity.

Large roller diameters provide maximum trunnions with large fillets for increased strength—capacity—wear-resistance.



Lubrication groove in outer race, oil holes in both inner and outer races permit easy, effective lubrication to the channel and rolling elements.

Stainless steel retaining bands spot welded into position for positive roller retention. Resist entry of foreign matter. Fragile lips eliminated.

Unit outer race assembly for operation on hardened, ground shaft allows easy installation. Torrington Heavy Duty Needle Bearings are available from stock in a complete range of sizes. Try them—compare them for VALUE!

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.

TORRINGTON *HEAVY DUTY NEEDLE* **BEARINGS**

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

They Say—

Synthetic Oil Approaching

"There is general agreement that this nation will find it necessary in the foreseeable future to supplement domestic and imported petroleum with synthetic oil and that the technology for the production of synthetic fuels from coal and oil shale should be developed at an early date.

"Although the potential oil production from our important coal reserves is about 10 times as large as that from oil shale, the latter probably will be used in the first synthetic liquid fuels plants because of the appreciably lower cost."

Secretary of Interior Douglas McKay in a speech before Congress.

Supply There, But Costly

". . . With our petroleum requirements expected to continue increasing at a rate of about 5 per cent per year and our ability to produce beginning to lag behind, it is believed that by 1975, or maybe 1985, the United States production may satisfy only about 25-35 per cent of our requirements. This immediately poses the question as to how we expect to make up the difference. . . .

"One possibility that is under commercial development at the present time is the conversion of natural gas into motor fuels . . . even this modest conversion of natural gas to petroleum products without further expansion of industrial uses would use up our known reserves in about 15 years . . .

"Shale has also come in for considerable publicity as a potential source of petroleum products and it is interesting to note that 55 per cent of the known shale deposits in the world are in the United States with another 43 per cent in Brazil . . .

"Tar sands . . . and the various forms of coal are other potential sources of petroleum products . . . Processes for converting both tar sands and coal into high quality petroleum products are known, but again the cost would be materially higher than for similar products derived from crude oil.

". . . We might say that we may be running out of petroleum products 'at today's prices,' but at a somewhat greater cost, the supply is certainly assured for many years to come. . . ."

Dr. W. E. Bradley, manager of research, Union Oil Co. of California, in an address before the Pacific Region of the North American Gasoline Tax Conference.

Confusion Clarified

Sir:

We respectfully bring your attention to an article contained in your April 19 edition of your Oil and Gas Journal. We would like to bring your attention to page 237 to the article headed "Natural Gas . . ."

In your first paragraph you state that "Bismarck, N. D.—A lawsuit seeking to declare Montana-Dakota Utilities Co.'s natural-gas pipeline from Wyoming-Montana to North Dakota a common carrier has been filed in U. S. District Court here. Plaintiffs are Industrial Gas Co. and Mondakota Gas Co. John White of Billings, Mont., is president of both firms."

. . . John Wight is president of Mondakota Gas Co. only and not president of Industrial Gas Co.

To clarify Mr. Wight's activity in Industrial Gas Co. is only to the extent of being a minority stockholder and serving in an advisory capacity. . . .

C. George Swallow
Secretary-Treasurer
Industrial Gas Co., Inc.

"We Must Build"

"For the past few years our construction have averaged about $50,000,000 a year. For 1954 it will amount to approximately $108,000,000. The reason for the large increase is simply this—we have to provide for a much larger increase in gas load this year than we have in years past. In order to sell the new gas—and we must pay for it whether we take it or not—we must build the facilities to deliver it to satisfy this pent-up demand about which we have just spoken.

"It is a big job. . . . The 1954 program involves some 123,000 individual jobs. We will use 128,000 tons of pipe, casing, and tubing. We will install 37,305 additional horsepower in new and existing compressor stations. . . ."

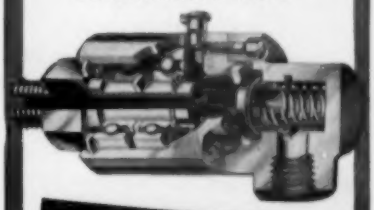
Stuart M. Crocker, chairman of the board of Columbia Gas System, Inc., at a stockholders' meeting.

Restrictive Imports Foe

"The value of American foodstuffs bought by Venezuela in 1952 and 1953 totaled 68 million dollars—paid for in cash, remember . . .

"The dollars used so eagerly by the Venezuelans to buy the products of American farms and factories come largely from the sale of oil. Restrictive import quotas . . . would reduce Venezuelan crude oil production daily by

REDUCE
"Down-Time" and Maintenance



Specify DEUBLIN
ROTATING
AIR UNIONS

For dependable, low-cost transmission of air from stationary to rotating machine parts, it will pay you to use Deublin Rotating Air Unions. Following are typical advantages engineered into these precision-built unions which combine to reduce "down-time" and save on maintenance.

✓ **LEAKPROOF AIR SEAL**
Hardened and lapped Graph-Mo tool steel running against a lapped carbon sealing face provides the best known air-sealing method.

✓ **NEW BALANCED SEALING**
Air is balanced within the unit so line pressures can not increase load on seal faces, thus increasing seal life.

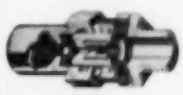
✓ **MINIMUM TORQUE**
Starting and running torque held to constant minimum through balanced sealing and two single row, sealed-for-life ball bearings. This permits higher operating speeds.

✓ **DURABLE CONSTRUCTION**
Light weight, yet built for long trouble-free performance.

✓ **SIMPLIFIED MAINTENANCE**
Only the seal faces are expendable. Easily replaceable on the job.

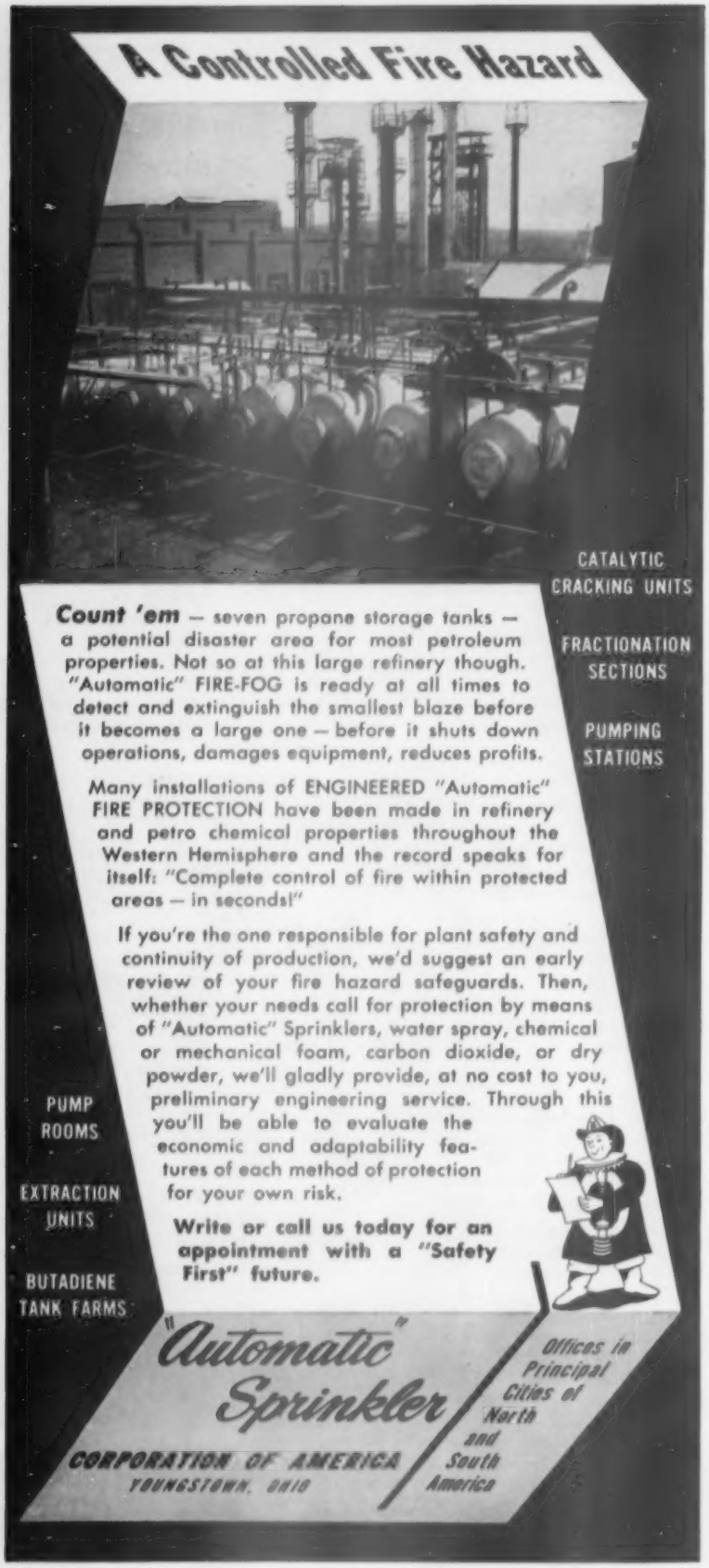
✓ **OPERATING DATA**
Maximum speed, 3500 r.p.m. Maximum pressure, 150 p.s.i.

Ask your local supply store for details and prices.



Get the facts about the new Deublin CHATTER-PROOF Quick-Release Valve

DEUBLIN COMPANY
Precision Products for the Petroleum Industry
1155 Waukegan Road, Glenview, Illinois


A Controlled Fire Hazard
CATALYTIC CRACKING UNITS
FRACTIONATION SECTIONS
PUMPING STATIONS
PUMP ROOMS
EXTRACTION UNITS
BUTADIENE TANK FARMS
Count 'em — seven propane storage tanks — a potential disaster area for most petroleum properties. Not so at this large refinery though. "Automatic" FIRE-FOG is ready at all times to detect and extinguish the smallest blaze before it becomes a large one — before it shuts down operations, damages equipment, reduces profits.
Many installations of ENGINEERED "Automatic" FIRE PROTECTION have been made in refinery and petro chemical properties throughout the Western Hemisphere and the record speaks for itself: "Complete control of fire within protected areas — in seconds!"
If you're the one responsible for plant safety and continuity of production, we'd suggest an early review of your fire hazard safeguards. Then, whether your needs call for protection by means of "Automatic" Sprinklers, water spray, chemical or mechanical foam, carbon dioxide, or dry powder, we'll gladly provide, at no cost to you, preliminary engineering service. Through this you'll be able to evaluate the economic and adaptability features of each method of protection for your own risk.
Write or call us today for an appointment with a "Safety First" future.
"Automatic" Sprinkler
CORPORATION OF AMERICA
YOUNGSTOWN, OHIO
Offices in Principal Cities of North and South America

some 400,000 bbl. This would mean a loss of something over 100 million dollars in yearly revenue to the Venezuelan Government, or about 20 per cent of its total annual income. It would mean that Venezuela would have much less to spend in the American market. . . ."

Arthur T. Proudfit, president of Creole Petroleum Corp., in an address before the Export Managers Club of Chicago.

First Duty to Stockholders

"One of the most important areas of management responsibility . . . is often overlooked. Not only is it management's job to plan ahead for the physical growth of industry in fulfilling its duty to stockholders; it also must plan so that the future stewardship of the business is assured.

"Corporations have a life far longer than the men who serve them, and that life is guaranteed only if a new crop of efficient managers is constantly being sown. So of all the responsibilities that management owes to the stockholders of a business, probably first comes that one of developing executive replacements."

John R. Suman, vice president of Standard Oil Co. (N. J.), in an address before the Pacific Coast District Meeting of the Division of Production of the American Petroleum Institute.

U. S. Share Expected

"Present indications are that your United States subsidiaries in 1954 will enjoy an even more successful year than in 1953. Although oil is becoming increasingly difficult and costly to find, we in the United States companies are confident of finding our full share."

Robert E. Kepke, executive vice president of British-American Oil Producing Co., at a shareholders meeting.

CALENDAR OF EVENTS

MAY

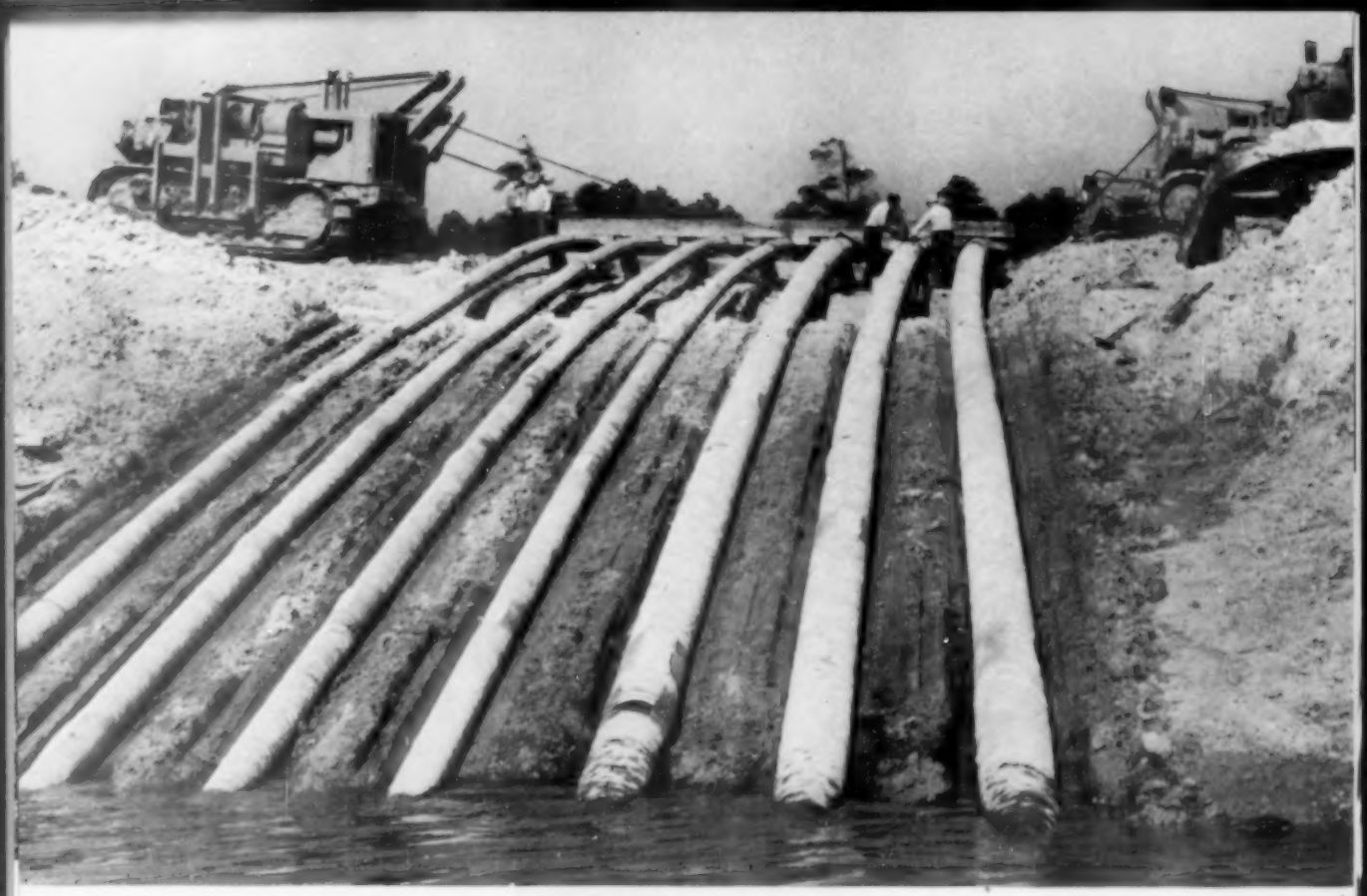
27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

2-4 Southern Gas Association, short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex.

3- 4 Pennsylvania Grade Crude Oil Asso-



Here five of Panama-Williams' HD-20 Tractors are shown pulling the seven lines into the channel.

Allis-Chalmers Tractors Are Key Machines in Spectacular 7-Pipe Channel Crossing

TEN HD-20 TORQUE CONVERTER CRAWLERS HELP PANAMA-WILLIAMS CORP. PULL 2 MILLION POUNDS OF PIPE ACROSS 2500-FOOT HOUSTON SHIP CHANNEL

The biggest multiple crossing job ever tried in the U. S. — that's how observers tabbed the simultaneous pulling of seven concrete coated pipelines across the Houston Ship Channel. The three 12-inch and four 8-inch lines were winched from shore to shore by the combined pull of a barge winch and the tremendous force of 10 Allis-Chalmers HD-20 Tractors.

Three-Stage Operation

Four tractors and the barge winch pulled the 900-ft-long first section into the water. When the second 900-ft section was welded on, seven tractors and the barge winch moved the load. Addition of the final 900-ft section brought the total pipe weight up to over 2 million lb. Eight tractors on one shore and two tractors, plus the barge winch on the other shore, made the final pull. Three barges were used to buoy the pipe.

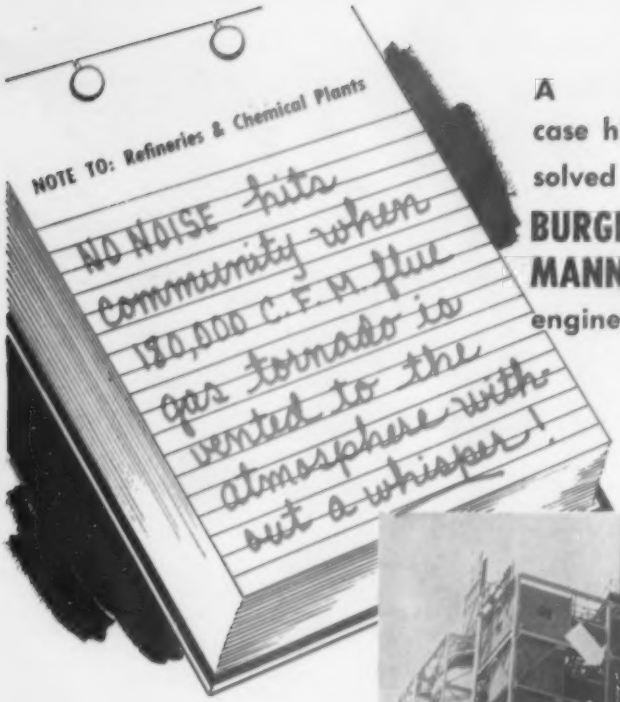
Torque Converter Power Does it Again

Just as on the big Straits of Mackinac crossing, the power and smoothness of Allis-Chalmers torque converter tractors was tremendously important. Pulling was done through each tractor's side boom winch or rear-mounted winch, and the smooth engage and torque converter's automatic matching of speed and power to load let all machines work together as a single force. Combined pull of the tractors was estimated at over 3 million pounds. Also, the excellent balance of the HD-20 was particularly important because of the great side pull through the boom winch.

The Houston Ship Channel pull adds another dramatic chapter to the story of Allis-Chalmers tractors on the pipelines. Your dealer will be happy to give you feature-by-feature reasons why the HD-20 and the HD-15, now available with optional torque converter drive, give this outstanding pipeline performance.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

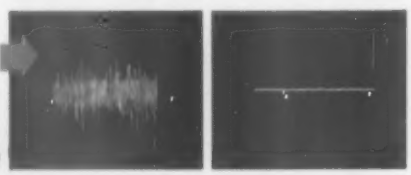

NOTE TO: Refineries & Chemical Plants
NO NOISE fits community where 120,000 C.F.M. flue gas tornado is vented to the atmosphere with out a whisper!

A case history solved by **BURGESS-MANNING** engineers!

The intense discharge roar of a catalyst regenerator on a fluid catalytic unit was more than the surrounding area could take without protest. For the sake of good public relations, something had to be done — so Burgess-Manning engineers were called in. The installation of a Burgess-Manning 66″ Flue Gas Snubber effectively hushed the Big Noise.

Refinery plant becomes a Better Neighbor when Burgess-Manning Snubbers quiet roar.

When a Burgess-Manning Snubber is installed, the high velocity gas that produces annoying roar is converted to a smooth and quiet stream.



BURGESS-MANNING COMPANY

1203 DRAGON STREET
DALLAS, TEXAS

Sound Engineering

LIBERTYVILLE, ILL.
CHICAGO, ILL.

ciation, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

14-17 Twenty-sixth annual confrence and exhibit, Oil and Gas Division of the American Society of Mechanical Engineers, Hotel Muehlebach, Kansas City.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

17-19 National Oil Scouts and Landmen's Association, annual meeting, New Orleans.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

20
July 4 Seventh annual Conferences on Personnel Administration and Managerial Development, Industrial Relations Section of the California Institute of Technology, California Institute of Technology, Pasadena, Calif.

21-25 Gordon Research conferences, conference on petroleum, Colby Junior College, New London, N. H.

24-25 Western Petroleum Refiners Association, regional meeting, Leonard refineries auditorium, Alma, Mich.

27
July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

JULY

13-14 Western Plant Maintenance Conference, Ambassador Hotel, Los Angeles.

15 Southern Gas Association, conference on radio communications for pipelines, Adolphus Hotel, Dallas.

16 Southern Gas Association, dispatchers' conference, Adolphus Hotel, Dallas.

29-31 Wyoming Geological Association, ninth annual field conference, Casper, Wyo.

AUGUST

13 Southern Gas Association, conferences on pipeline operations and pipeline engineering, Rice Hotel, Houston.

16-18 Society of Automotive Engineers, West Coast annual meeting, Statler Hotel, Los Angeles.

20 Southern Gas Association, conferences on natural-gas gathering and natural-gas processing, Captain Shreve Hotel, Shreveport.

23-25 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

8-10 Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

TEX-Lift

LONG STROKE HYDRAULIC PUMPING UNIT

YOUR WAY TO PROFITABLE STRIPPER PRODUCTION

CHECK THESE FEATURES

EASY TO SET

A TEX-Lift can be installed in a few hours time by a workover crew and rig. No foundations, braces or guy wire are required.

EASY TO CHECK

Your pumper can check the operation of a TEX-Lift at a glance through a clear plastic window set at eye level.

EASY TO ADJUST

Changes in speed and stroke are made simply by regulating two control valves. This feature simplifies adjusting the unit to obtain maximum production.

EASY TO SERVICE

The only stuffing box on a TEX-Lift can be adjusted externally, or repacked without disconnecting any part of the unit. Only ordinary hand tools are required.

Because of their low original cost, you're money ahead at the very beginning when you select TEX-Lift Hydraulic Pumping Units. You add additional savings upon installation, because a TEX-Lift requires little more than making up a few connections. After that, your savings increase every day that your TEX-Lifts are in operation because they are more efficient, require less attention and can be more easily adjusted to meet producing requirements.

To all of the recognized advantages inherent in slow speed, straight lift pumping units . . . lower sucker rod stresses, longer life for surface and sub-surface equipment, longer efficient pump stroke, more production per horsepower . . . the TEX-Lift adds such important features as automatic lubrication, instantaneous selection of speed and stroke, a fully protected hydraulic system and provisions for direct dynamometer readings. Together, these add up to *lower lifting costs*, which automatically means more profit from your stripper production.

In their various sizes and models, TEX-Lifts will meet all of your stripper production requirements. Get complete information now from your Texsteam representative, or write for your copy of the TEX-Lift catalog.

TXT TEXSTEAM *Corporation*

DIVISION OF VAPOR HEATING CORP.

330 HUGHES ST. • P. O. BOX 9127, HOUSTON 11, TEXAS • PHONE WO-8873

More than a mere pipe fitting!
catawissa
PERFECT SEAL
unions
give a 3 to 1
safety factor
PLUS
A PERFECT SEAL!
THERE'S A CATAWISSA PERFECT SEAL UNION FOR EVERY USE . . . ALL TEMPERATURES, ALL PRESSURES!
The full dependability of HOT FORGED STEEL is yours in a Catawissa Union (hot forged from solid steel bars) with several extra value features that are exclusive here at the UNION SPECIALISTS!
All Catawissa Unions are designed to give a 3-to-1 SAFETY FACTOR . . . 3,000-lb. service unions are tested to 9,000-lbs., 6,000-lb. service unions tested to 18,000-lbs., etc.
Exclusive Ball-to-Angle seat design assures a PERFECT SEAL even when the pipe is not in alignment!
Machining operations assure a UNIFORMITY AND ACCURACY heretofore found only in special fittings and, with rigid inspection both during and after machining, guarantees LEAKPROOF CONSTRUCTION!
Satisfaction is guaranteed in any application—whether it be general low pressure service or extremely high pressures and temperatures (for air, oil, gas, chemicals, hot oils, gases or steam).
WRITE FOR CATALOG 11
AVAILABLE FROM LEADING INDUSTRIAL SUPPLY FIRMS
CATAWISSA VALVE & FITTINGS COMPANY
450 MILL ST. ★ CATAWISSA, PA.

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.
23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.
27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.
27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.
28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.
30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.
4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.
4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.
6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.
7- 8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
7-8 American Institute of Mining and Mettallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.
11-13 American Gas Association, annual convention, Atlantic City, N. J.
11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.
12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-17 Permian Basin Oil Show, Odessa, Tex.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.
4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.

EXPERIENCE

THE KEY TO CORE ANALYSIS QUALITY

The ability to anticipate the inconstant behavior of productive horizons and to blend that knowledge with the compilation of mechanically-procured information is the true measure of core analysis quality. This interpretive accuracy comes only through experience.

In addition to its use as an immediate aid in the proper completion of key wells, what will be your future needs for reliable reservoir information? Financing of development operations? Sale of reserves? Secondary recovery? Unitization? State regulatory proceedings?

Your Core Lab Report carries the inherent advantages of 18 years' service and recognition, 25,000 individual core analyses, 700 different reservoir fluid analyses. And day after day, 28 area facilities add their experience to this growing back-log of proficiency.

CORE LAB

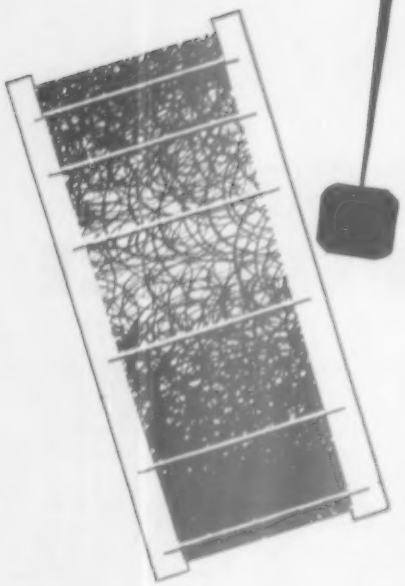
PETROLEUM RESERVOIR ENGINEERING

CORE LABORATORIES, INC.

801 CORE STREET, DALLAS, TEXAS

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, TULSA, FT. WORTH, WICHITA FALLS, OKLAHOMA CITY, ARDMORE, PAMPA, ARKANSAS CITY, GREAT BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, JACKSON, LAFAYETTE, DENVER, BAKERSFIELD, WORLAND, STERLING, BILLINGS, CASPER, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON, CALGARY, EDMONTON, REGINA, CANADA, VENEZUELA, S. A.

SELECTIVITY



another reason why

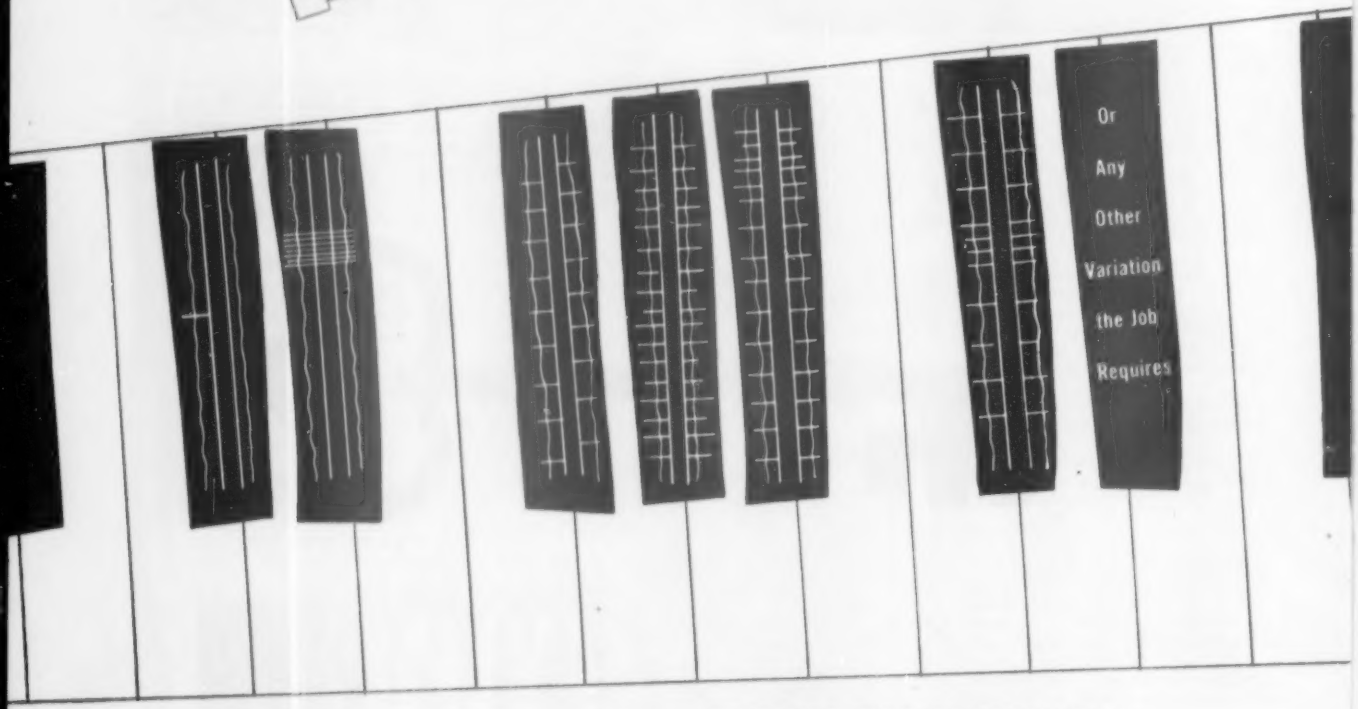
LANE-WELLS PERFORATING

is your best bet!

Wallop a bass drum and you get just one sound, but a piano—there's no limit to the variations: it's up to you.

In perforating, LANE-WELLS gives you that same selectivity. Firing one shot at a time, the operator delivers the exact perforating density your well conditions demand.

One of the good reasons why, for more than 20 years, experienced operators have called on Lane-Wells and had the job done right.



WRITE FOR FURTHER INFORMATION

Tomorrow's Tools - Today!

LANE WELLS COMPANY

AG-706

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

●

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

EDITORIAL STAFF

TULSA OFFICE, 211 South Cheyenne Avenue, Phone 3-6291: Kenneth B. Barnes, **Editor;** Henry D. Ralph, **Chief Editorial Writer;** Ted A. Armstrong, **News Editor;** Gerald L. Farrar, **Engineering Editor;** Dr. Frank J. Gardner, **Exploration Editor;** Paul Reed, **Pipeline Editor;** John C. Reidel, **Petrochemical Editor;** C. O. Willson, **Consulting Editor;** W. L. Nelson, **Technical Editor;** Lynn M. Nichols, **Presentation Editor;** John C. Casper, **Economics Editor;** Neil Williams, **Associate Editor;** Edwin McGhee, **Drilling-Production Editor;** Norman S. Morrisey, **Drilling-Development Editor;** Paul Swain, **Assistant News Editor;** Robert G. Deering, **Assistant Pipeline Editor;** R. B. Tuttle, **Equipment Editor.**

Tulsa District Editors: Charles L. Burch, Carl Hoot, John C. McCaslin, John M. McGivern, and Carl J. Lawrence.

Tulsa Editorial Assistants: Helen Brown, Martha Allbright, Alice Burt, and Aileen Cantrell.

NEW YORK OFFICE: 500 Fifth Avenue, Phone LOngacre 4-1750: George H. Weber, **Refining Editor,** and Dahl M. Duff, **International Editor.**

HOUSTON OFFICE, 802 Sterling Building, Phone CHarter 4626: F. Lawrence Resen and William P. Sterne, **District Editors.**

DALLAS OFFICE, 1238 Mercantile Bank Building: Robert J. Enright, **District Editor.**

LOS ANGELES OFFICE, 650 South Grand Avenue, Phone VAndyke 0722: D. H. Stormont, **District Editor.**

WASHINGTON OFFICE, 621 Albee Building, Phone DI 7-1710: Bertram F. Linz, **District Editor.**

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

Advertising Offices: TULSA, John D. Reilly, Mid-Continent Manager and George O. Ruppert, Representative, 211 South Cheyenne, Phone 3-6291; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre 4-1750; CHICAGO: E. S. Klappenbach, Midwestern Manager, and David T. Kenney, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic 1-4835; HOUSTON: John M. Spears, Gulf Coast Manager, Sterling Bldg., Phone CHarter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone VAndike 0722; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702

●

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1954 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

Made in Texas

MUCH as we hate to apologize for anything our favorite oil publication does, we have to admit that this issue doesn't do justice to its subject.

It's devoted especially to Texas, but with only 462 pages to work with we couldn't begin to tell half of the great and marvelous things about the Lone Star State and its stupendous oil and gas industry.

Knowing how proud Texans are about the size of everything in their state, we approached this assignment with fear and trepidation, almost in as big a quandary as the frustrated Texan who couldn't decide whether to brag that his state had the biggest midgets or the smallest midgets.

We didn't want to offend Texas by failure to get in enough superlatives, but on the other hand we didn't want to give an inferiority complex to the other half of the nation's oil industry scattered here and there among the 47 outlying states. We even considered skipping the whole subject, in line with the advice never to ask a man where he's from because if he's from Texas he'll tell you and if he isn't you shouldn't embarrass him.

We solved the dilemma (we hope) by letting Texans tell their own story, for the most part. You'll notice that most of the articles in this issue were written in Texas by Texans. And those of us on the staff who wrote special articles based our research on material supplied by Texans.

So if you Texans think we said too little about the state and if you non-Texans think we said too much—put the blame on the Texans who supplied us the dope. At any rate, this is quite a special issue about a quite special oil state.

A Few Words . . .

OUR own personal assignment for this issue was to write a "lead piece," a sort of introduction to the special section explaining how Texas oil got that way. We felt like the Texan who wandered into a Quaker meeting and during the silent meditation stood up and said that if nobody else had anything to say he'd like to say a few words about Texas.

Our "few words" ran into several thousand and we hardly got past Spindletop. However, we tried hard to get in a bit of the Texas flavor by using such words as "first," "most," and "biggest" a few times. We really should have used a lot of exclamation points in that article, but we couldn't because we had got ourself so thoroughly imbued with the Texas spirit. You see, we wrote it on a non-Texas typewriter which isn't equipped with an exclamation point, so to make one we would have to write a period first and then back up and write an apostrophe over it. And since no true Texan ever backs up we just couldn't write an exclamation point.

Not being (to our shame) an expert on Texas, we had to do a lot of research to get those few words abov' Texas. You know, if you copy from one book it's plagiarism, but if you copy from five books it's research. We did a lot of research on Texas oil.

Texas' Needs

IT used to be said that all Texas needed was a little more water and a few more good people (which is all that hell needs). Now it's said that all Texas needs is more rain and less oil imports. Well, it's rained some there lately.

Extra Plum

THE first man who opened this issue made like Little Jack Horner—he stuck in his thumb and pulled out a plum. The plum is an extra prize in this Texas package, a big wall map of the state featuring the basins and other geological structures and spotting the principal oil and gas fields. And the background is a color which most of us identified as a sort of maroon but which the printer calls plum. Be that as it may, this map will look right handsome on your office wall as well as giving a lot of useful information in handy form. Just one of the many extras you expect with the Big Yellow Book.

—Henry D. Ralph.

BAKER

offers 3 ranges of

Hinge-Lok Casing Centralizers

...to provide ample all-around cementing space for all casing programs, regardless of varying hole sizes or conditions.

"REACH" (Bowed Height) IS THE VITAL FACTOR All Baker HINGE-LOK Casing Centralizers have greater reach (or bowed height) of springs in corresponding ranges than any other casing centralizers on the market. Increased reach means adequate, all-around cementing space, even though the hole size may vary considerably from the drill bit size.

WHY REACH IS NEEDED In oversize sections of open hole, centralizers with insufficient reach frequently fail to contact the wall of the hole and thus perform no work. As a result, adjacent centralizers above and below can be so overburdened that casing-to-wall contact is apt to occur. The end result is likely to be a poor cement job at any such point of contact.
The increased *reach* of Baker HINGE-LOK Casing Centralizers ensures that each centralizer will contact the wall of the hole within its range and will contribute its share toward an effective centering job.

MAXIMUM STRENGTH The engineered bow shape of the centralizer springs provides *greater landed centering force* than can be obtained from any other available hinge-type centralizer covering the same range of open hole sizes.

YOUR CHOICE OF THREE RANGES Choose the bowed height of spring best suited to meet the centering problem of your specific program. (See description of ranges, below.)

EXTRA FEATURES

- *HINGED FOR EASY MOUNTING*
- *ALL SPRINGS WORK TOGETHER*
- *UNLIMITED ROTATION OF CASING*
- *EASY STARTING WITHOUT SNUBBING*
- *ALWAYS PULLED—NEVER PUSHED*

BAKER MODEL "H" Hinge-Lok Casing Centralizers

20-RANGE
Product No. 9112
For LESS-THAN-NORMAL CLEARANCE where no problem of over-size or irregular hole is anticipated.

25-RANGE
Product No. 9113
For NORMAL CLEARANCE, where no serious problem of over-size or irregular hole is anticipated.

SUPER-RANGE
Product No. 9114
For GREATER-THAN-NORMAL CLEARANCE or where extensive hole irregularities are anticipated in otherwise normal clearance.

Call Baker for Centralizer Service

BAKER OIL TOOLS, INC. HOUSTON · LOS ANGELES · NEW YORK

Texas needs a bigger carrot for unitization

THE most significant thing about Texas oil during the past couple of years is the big increase in secondary-recovery and pressure-maintenance projects.

In spite of the high rate of wildcatting in virgin territory, Texas is turning to her "second crop" of oil, realizing that perhaps her greatest petroleum wealth lies in greater recovery from fields already discovered. Some 300 of these projects have been originated in the past 2 years, but more would be operating today if it weren't so difficult to form an operating unit.

It is fully accepted that the most oil can be produced by careful control of pressure and manipulation of the flow of fluids in a reservoir, and that the earlier this starts, the greater the recovery. But such reservoir-wide projects need the participation of all affected interests. And all too often interminable delay and prodigal waste are caused by the hesitance or obstinance of a small minority.

THIS BEING SO, it behooves the conservation authorities to do everything possible to induce unit operation where this will recover more oil. So-called compulsory unitization laws are working well in Oklahoma and Arkansas. But if Texas doesn't like to use a stick on the donkey, it should dangle more carrots in front of its nose. Unitization could be made more attractive by such means as:

- Bonus allowables, exemption from shut-down days, or other changes in proration methods to offset the very real objection of some operators that their income will be less during the initial phase of a unit operation than before.
- Wider initial well spacing while a new reservoir is being outlined and its characteristics determined, thereby avoiding premature freezing of the drilling and allowables patterns and reducing the investment needed to determine the feasibility of pressure maintenance.
- Fewer exemptions from standard spacing rules in a new field, particularly for town-lot drilling, to prevent clustering offsets around a discovery well and to require unitization of surface interests within a spacing unit, as in virtually every state except Texas.
- Reduction of discovery allowables where these tend to create conditions unfavorable to future unitization for greater ultimate recovery.

OTHER STATES, TOO, might well take parallel steps to speed unit operation where appropriate to the reservoir and where it will reduce waste and give greater ultimate recovery. But Texas, with so many fields involved, such an able conservation staff, and such a pride of leadership in conservation, should be in the vanguard.

Check and Double Check

✓ THE CEMENT

✓✓ AND THE JOB

Standard Oil Co. (N. J.) Photo

● In line with the ounce-of-prevention precept, the Oil Man checks conditions before cementing a well . . . then double checks by temperature log to see how the cement is distributed around the casing.

There's a parallel in the manufacture of Lone Star Cements for Oil Field service. These cements are checked every step of the way, from raw materials straight through to finished product, one of the most exacting quality-control processes in industry today . . . and double checked in our Oil-Well Cement Laboratory, under simulated field conditions as to pressures, temperatures and sulphate action.

The Oil Operator knows the problems to be met in the well . . . and there's a Lone Star Cement with the properties and characteristics that will do the job best. It's just a matter of selecting cement to fit the job.

Select Cement to Fit the Job!

LONE STAR CEMENT CORPORATION

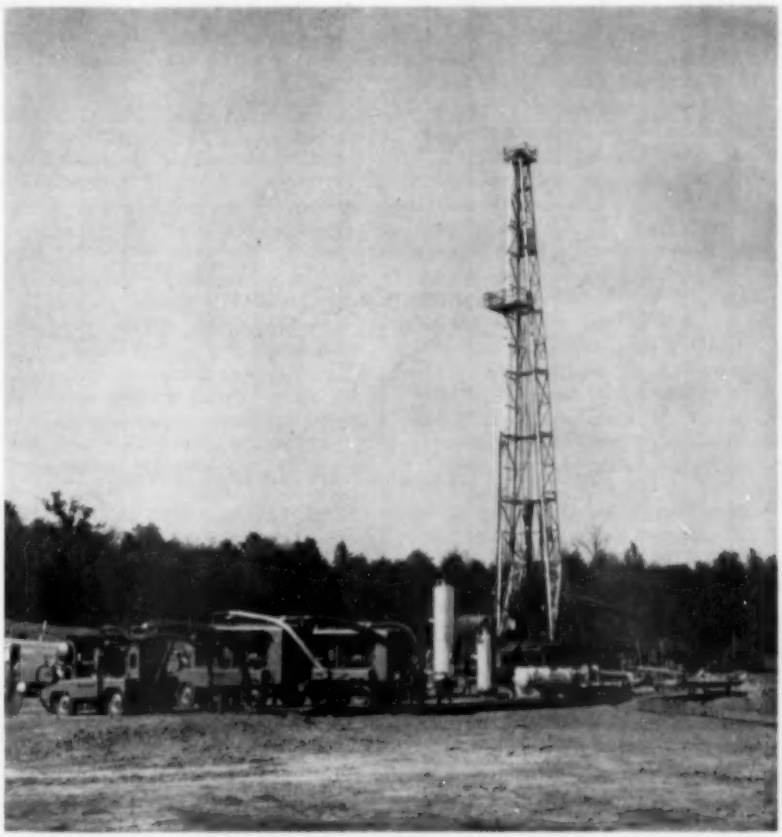
Offices: DALLAS • HOUSTON • ABILENE, TEX. • NEW ORLEANS • BIRMINGHAM • KANSAS CITY, MO. • ALBANY, N. Y. • BETHLEHEM, PA. BOSTON • CHICAGO • INDIANAPOLIS • NEW YORK • NORFOLK • PHILADELPHIA • RICHMOND • ST. LOUIS • WASHINGTON, D. C.

THIS WEEK . . . . . IN THE NEWS

INTERNATIONAL — Standard - Vacuum opens South Africa's first oil refinery at Durban. . . . The 17,300-bbl. daily plant includes combination unit with the new Model iV cracker, atmospheric distillation, and thermal reforming. . . . ¶Saudi Arabia publishes decree confirming shipping agreement with A. S. Onassis. . . . Confirmation of pact immediately draws fire from British and U. S. sources as "monopolistic." . . . ¶Shell loses control of its Indonesian properties in North Sumatra under official action of government. . . . ¶Idemitsu sidesteps Japanese Government ban on Iranian oil shipments by acting as "broker" for resale of Iran's oil to foreign markets. . . . ¶Plans announced for three wildcats in Central Queensland, clear across the Australian continent from Exmouth Gulf discovery. . . .

ECONOMICS—Both imports and exports decreased in March, according to Census Bureau figures. . . . Total imports decline of 17,000 bbl. results from drop in product imports, partially offset by a rise in crude receipts of 69,000 bbl. for the month. . . . Gasoline exports show steep drop and hit lowest level since February 1951.

TRENDS—Shift in carbon-black manufacture is heavily to liquid hydrocarbons and away from natural gas as feed stock. . . . Annual report of Bureau of Mines shows 43 per cent of 1953 total was oil black, compared with 34 per cent a year earlier and 11 per cent in 1948. . . . ¶Synthetic-rubber output in 1953 climbed 3.7 per cent, Tariff Commission figures disclose. . . . ¶Study of engineers' income shows those in the petroleum industry fare better than most. . . . Starting salary last year was $350 a month, topped only by those engaged in manufacturing scientific equipment. . . . ¶Study shows residual-fuel imports are not stealing bituminous-coal markets, in spite of current protests. . . . Rising sales of gas for industrial use may account from some of coal's heavy losses. . . .

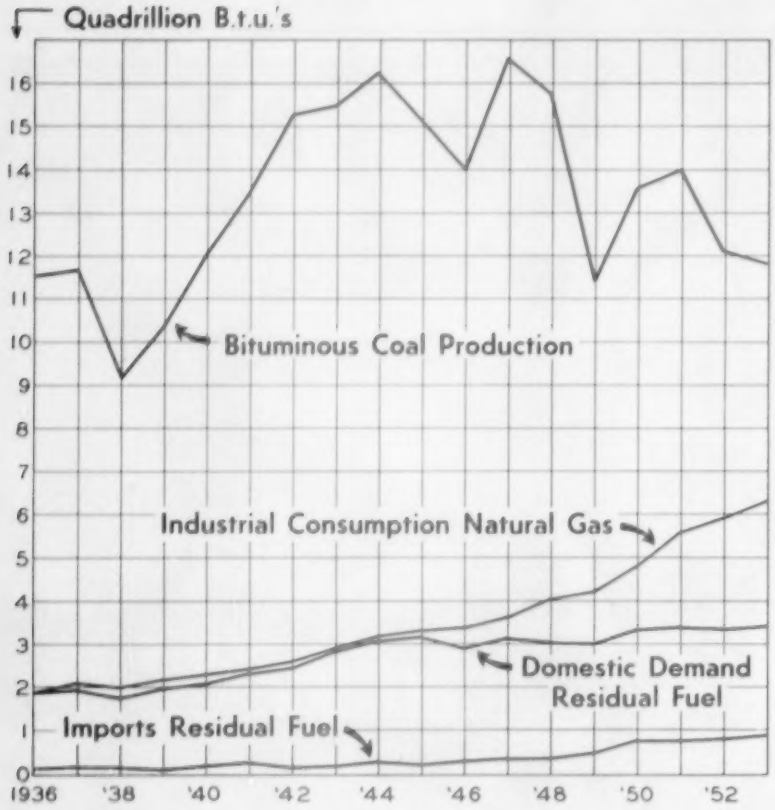


RANK WILDCAT WITH A NEW TECHNIQUE is this operation of Carter Oil Co. and Reynolds Metal Co. in Conway County, Arkansas. Exhaust gas from the drilling engines is being used as the drilling fluid by B. M. McGraw Drilling Co., Oklahoma City, the contractor. Shortly after this picture was made last week, the company switched temporarily to mud to penetrate a water zone. In the gas drilling operation, exhaust gases are cooled, the water is removed, and the remaining inert gases are compressed for circulating. The method eliminates the lost-circulation problem and reduces the fire hazard resulting from entrance of formation gas into the hole. This test, the I J. B. Jones, is more than 100 miles from oil production. Extreme hardness and tilted formations limited penetration to 1,500 ft. in 31 days of drilling. Experience with the drilling technique will be outlined in an early issue of the Journal.

NATURAL GAS—Alberta Government approves issuance of permits to Trans Canada for export of Alberta gas to eastern Canada and Minneapolis markets and to Canadian-Montana Pipe Line for exporting to Montana. . . . Next step for Trans Canada is a Dominion export permit. . . . ¶U. S. legislation designed to bar imports of gas from Canada comes under heavy fire from administration agencies. . . . ¶Bill is sponsored by Sen. Lester C. Hunt of Wyoming. . . . ¶Speaking before I.O.C.C., Spencer Chemical Co. president urges a higher price for gas as essential to conservation and an inducement to exploration and production of gas. . . .

EXPLORATION—Magnolia brings in first producer on federally controlled lands in the Gulf of Mexico since settlement of the tidelands dispute. . . . Wildcat 18 miles off Louisiana coast flows 406 bbl. daily. . . . Other gulf operators active. . . . ¶Deep gas-condensate field discovered southwest of Abbeville, La., made by Texas Crude Oil. . . . ¶First Phillips and Kerr-McGee wildcat in million-acre Alaskan block is dry hole. . . . Second test will be spudded soon. . . . ¶Ohio Oil cleans world's deepest well to 17,126 ft. . . . Fishing continues, but test scheduled at 17,100 ft.

INDUSTRY—Price of Penn Grade crude oil cut by 50 to 76 cents a barrel. . . . Tide Water initiated the reduction with a posting of $3 for Bradford crude, 76 cents below the old posting. . . . New price was met by Sinclair. . . . South Penn followed with a 50-cent cut for all areas. . . . ¶Richfield prepares to dedicate new refining facilities May 26. . . . Ceremony to climax expansion program costing $40,000,000. . . .



Coal Output Is Way Down, But . . .

. . . Resid Isn't to Blame

John C. Casper

IMPORTS of heavy fuel oil should not be charged with the depressed state of the bituminous coal industry.

For months the coal industry has been blaming imports for its dwindling production. Imported fuel oil, it is said, threatens to wreck the entire bituminous industry.

But trends in coal production and in residual-fuel imports show definitely that the small changes in fuel-oil imports could not possibly account for the major shifts in coal production. The whipping boy, if coal is really looking for one, apparently is natural gas. Another is a drop in coal exports.

One effect of all the charges leveled at the fuel-oil importers has been to cloud discussions within the industry on whether imports are supplementing or supplanting oil production.

What has happened . . . Most of the large shifts in coal production can be explained on a basis of changes in general industrial activity.

In 1947, for example, the marked increase in coal output corresponded to the rise in the Federal Reserve Board Industrial Production Index.

The drop in 1949, followed by the rise in 1950, also is reflected in changes in the general production index. The 1949 decrease in bituminous coal output amounted to 4.3 quadrillion B.t.u.'s. This drop could not have been caused by a gain in residual imports of 0.13 quadrillion B.t.u.'s.

Since 1950, however, there has been a general decline in the domestic use of coal. The cuts in output in 1952 and 1953 cannot be explained by changes in general industrial activity, since total industrial production increased in both years. In 1951, too, domestic consumption of coal was down, but a big increase in exports resulted in a net gain in production.

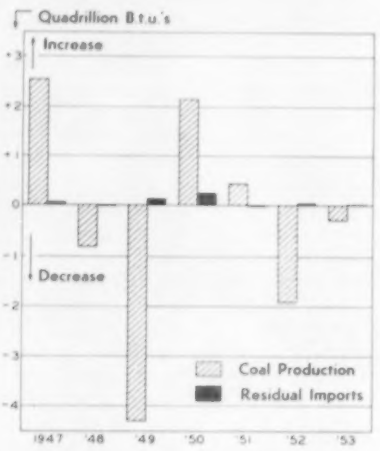
In the Charts . . .

THE large chart shows the market trends in recent years of the fuels competing for the industrial market.

In the case of natural gas, only industrial consumption is shown, since domestic and commercial consumption do not compete directly with bituminous coal.

The lines represent total energy, with all fuels converted to a common basis of measurement—heat content in B.t.u.'s.

The smaller chart compares changes in coal production and residual-fuel imports for the 1947-53 period. Here, also the fuels are expressed in quadrillions (10^{15}) B.t.u.'s.



Actually, except for the rise after the sharp drop in 1949, coal has been on the downgrade since 1947. Rising industrial sales of natural gas indicate that some of coal's market here may have been lost to gas. As shown on the large chart, it is the only fuel with enough increase to account for some of the abnormal decreases in coal production.

The gas influence . . . Industrial consumption of natural gas showed steady but inconspicuous increases from 1936 through 1947. In contrast, industrial sales took a sharp turn upward starting with 1948.

The postwar construction program included large-diameter long-distance pipelines from the gas areas of the Southwest to the individual areas on the upper East Coast and in the North Central states.

To show a profit, these lines must

operate at near capacity at all times. Sales for residential and commercial heating drop off to nothing in the summer months, and deliveries for water heating and cooking tend to decrease. Reduced consumption by residential and residential customers results in a summer surplus that must be sold to industrial accounts on an interruptable basis. These industrial sales compete directly with bituminous coal.

Residential customers pay the highest prices for natural gas and are preferred users. For example, the average price paid for natural gas in 1952 by residential customers in Illinois was 93.4 cents per M.c.f. compared with 69.0 cents paid by commercial users, and with 28.7 cents by industrial accounts other than those in petroleum and natural-gas production.

Since the preferred customer load cannot be spread over the year by equal monthly sales, the next best solution to the problem is storage of the surplus summer gas near the point of sale to cover peak loads during the following winter months.

Increasingly larger portions of the capital expenditures of natural-gas companies have been for gas storage in consumer areas. Every underground storage sand that is opened reduces the amount of natural gas that must be sold to industrial accounts in competition with bituminous coal.

Some of the industrial-fuel competition from natural gas may level off or even decrease in the future. Greater summer storage and higher well-head prices will tend to shift more of this premium fuel to premium-paying uses.

Hearing Set on Long Line

WASHINGTON. — The Federal Power Commission will hold oral arguments on American Louisiana Pipe Line Co.'s plans to build a 1,289-mile natural gas line from Louisiana to Michigan.

American Louisiana will be joined by two subsidiaries, Michigan-Wisconsin Pipe Line Co. and Michigan Consolidated Gas Co., and Texas Gas Transmission Corp. in presenting its arguments.

Texas Gas proposes to build facilities to sell the gas to American Louisiana; American Louisiana proposes to build the line; and Michigan Wisconsin and Michigan Consolidated propose to build projects to receive the gas from American Louisiana.

The FPC is interested in determining whether an adequate supply of gas exists to supply the project indefinitely.

Engineers' income revealed in . . .

E. J. C. Survey of Industry Pay

NEW YORK.—Engineers in the oil and gas industry stack up favorably from an income standpoint with engineers in general.

According to a survey conducted by the Engineers Joint Council, the starting salary for engineers in the oil and gas industry is about as high as any branch of engineering. The median salary paid oil and gas engineers after 35 years' experience is as high as in any engineering field.

The figures on petroleum industry engineers are based on salary reports from 16 companies which answered the E.J.C.'s questionnaire and represent reports on 5,498 engineers engaged in the "extraction of crude petroleum and natural gas, and the manufacture of the products of petroleum and coal."

The survey revealed starting salaries for oil and gas engineers ranged from $315 to $388 a month in 1953 and averaged $350. This average figure was equalled by engineers employed in the manufacture of professional and scientific instruments and topped only by engineers employed in the transportation equipment manufacturing industry.

The council arrived at a "median" salary for petroleum industry engineers based on the year of baccalaureate degree and also an upper and lower quartile figure. The median figure is that which is in the center of the series. The E.J.C. regards it as less distorted than "an average" figure because the series contains extreme values.

The upper and lower quartile figures are the half-way points in the upper and lower halves.

The survey revealed that 1952 graduates employed in the oil and gas industry earned median annual salary of $4,572. The upper quartile of this group was paid $4,920 and the lower quartile $4,213.

The income of engineers rises in ratio to the number of years of experience until the peak of $14,990 is the annual income of the upper quartile who completed college work between 1915 and 1919. The median engineer in this age-experience bracket is paid $11,400 and the lower quartile of this category is paid $8,280.

ANNUAL EARNINGS BY YEAR OF BACCALAUREATE DEGREE

	1952	1949	1940-44	1935-39	1930-34	1925-29	1920-24	1915-19	1910-14
Upper Quartile	4,920	5,960	7,736	9,979	11,434	12,657	12,666	14,990	12,646
Median	4,572	5,039	6,757	8,356	8,840	9,840	9,952	11,400	11,708
Lower Quartile	4,213	4,980	5,769	7,062	7,303	7,714	7,818	8,280	8,363

Liquid hydrocarbons replacing . . .

. . . Natural Gas as Carbon Black Feedstock

PRODUCTION of carbon black from liquid hydrocarbons in 1953 was almost five times as much as in 1948.

Liquid hydrocarbons have not only accounted for all the gain in carbon black production, but also have replaced some of the natural gas that once was the primary source of carbon.

Total carbon black production in 1953 amounted to 1,610,437,000 lb., according to the annual report by the Bureau of Mines.

Production from liquid hydrocarbons represented almost 43 per cent of the total or about 689,000,000 lb. compared with 547,000,000 lb. or 34 per cent of the total in 1952 and 11 per cent in 1948.

For the 5-year period, 1948-1953, natural-gas consumption by carbon black plants dropped from 480,646 M.M.c.f. in 1948 to 300,942 M.M.c.f. in 1953. On the other hand, use of liquid hydrocarbons climbed from an estimated 44,600,000 gal. in 1948 to 187,207,000 gal. in 1953.

Process shift . . . The continuing shift from channel production to furnace processes has made it possible to increase the yield from gas. The average yield in 1953 was 3.06 lb. per thousand cubic feet, the first year with an average above 3.0. The yield from liquid hydrocarbons averaged 3.68 lb. per gallon in 1953 compared with 3.35 lb. in 1952.

Natural gas prices at carbon black plants increased more in 1953 than in any year since 1948. The average value of natural gas used at plants in 1953 was 6.51 cents per thousand cubic feet compared with an average of 5.46 cents in 1952.

Total capacity of the 52 plants operating at the end of the year was 5,342,100 lb. per day compared with 5,643,100 lb. per day for 59 plants at the end of 1952.

High Gas Price Urged

Spencer Chemical president tells I.O.C.C. higher price for gas essential production, conservation incentives

Henry D. Ralph

SAVANNAH, Ga.—A gas consumer who wants higher prices for natural gas made a plea for conservation at the spring meeting of the Interstate Oil Compact Commission here.

Kenneth A. Spencer of Kansas City, president of Spencer Chemical Co. and Pittsburg Midway Coal Co., who made the featured address at the meeting, spoke on the consumer's interest in the availability of gas and reflected the view that reserves of gas are quite limited and should be used primarily for superior purposes.

"The consumer must realize that continuity of supply and reasonable price depend upon conditions which provide adequate incentives for production, transmission, and distribution," Spencer said.

"I think we all agree that nothing can be more detrimental to the consumers' long-term interest than an artificially depressed price structure which discourages new exploration."

High price effects . . . Comparing the recent increase in consumption with the growth in new reserves discovered, Spencer concluded that exhaustion of supplies is inevitable and that the main problem of gas conservation is to ration a fixed supply to best serve the national interest in the hope that reserves will last until a gradual transition can be made to other fuels.

Spencer opposed end-use control by regulation as being unworkable, but said that higher prices would make many industrial users turn to coal or oil for boiler fuel. He pointed out, however, that this would increase the peak-load problem of transmission companies unless the transition is made gradually.

The kind of conservation which will extend the life of our gas resources without contributing to exorbitant prices and without involving further regulations, Spencer said, can best be attained through:

. . . Reasonable federal and state regulations which recognize the validity of a fair field price and which discourage the sale of "dump" gas without resort to end-use control.

. . . A vigorous extension of underground storage facilities and other means of supplementing peak-load demands.

. . . Exercise of prudence and restraint by natural-gas companies, particularly in holding down sales of dump gas for industrial uses.

. . . Development of attractive alternates for natural gas, particularly for residential space heating.

. . . Continued efforts by all concerned to eliminate wasteful practices.

Spencer Chemical Co. dislikes to burn gas for fuel, he said, but it is offered at such a low price in the summer that the company can hardly afford not to. On the other hand, the company uses large quantities of natural gas as a raw material for fertilizer and petrochemicals, and would like to see gas conserved for chemical and household uses.

In time, Spencer predicted, developments in coal technology will permit an economical shift from gas to coal as a chemical source, but this would be extremely costly at present. He also anticipated that gas eventually will be partially displaced for household heating by such developments as electrical radiant heating, the so-called heat pump, or by a combination oil-gas burner to level off peak loads.

Gas field price . . . The field price of gas as it relates to conservation was one of the principle topics of discussion by the Compact Commission.

Commissioner Dale E. Doty of the Federal Power Commission was questioned closely on the forthcoming FPC investigation (Docket R-137) into the operation of escalation and "most favored nation" clauses in gas-purchase contracts.

Doty said that the FPC is completely open minded on the subject and may take no action after obtaining all the facts, but that it is becoming increasingly concerned over the prospect that gas rates of a particular pipeline may be set by conditions beyond the control of that line and not directly related to its operations.

Doty also said that so far the FPC has not recognized state minimum prices as controlling in determining the cost of gas produced by a pipeline company and that this policy was not specifically reversed in the recent decision in the Panhandle Eastern case.

The Compact Commission adopted a formal resolution commending the FPC for its recognition of a fair field price and calling on it to give further recognition to state conservation orders establishing minimum prices as a conservation measure.

Synthetic Rubber Output Gains

PRELIMINARY figures on 1953 production of elastomers, issued by the U. S. Tariff Commission, show a grand total of 1,958,350,000 lb. This represents an increase of 3.7 per cent over 1952 output.

Of the 1953 total, 72 per cent comprised the cyclic synthetic, polybutadiene-styrene type, of which all but about 2,000,000 lb. was produced in government-owned plants. In the acyclic class the greatest gain was made in the polychloroprene type which includes GR-M and neoprene. This class showed a 22.4 per cent gain over 1952. Production was off slightly on the GR-I and butyl types and some of the low volume miscellaneous elastomers.

PRODUCTION, 1,000 LB. PER YEAR

	1953 (preliminary)	1952
Elastomers, cyclic:		
Polybutadiene-styrene type (GR-S, Buna-S):		
Produced at government plants	1,413,097	1,393,982
Produced at private plants	1,847	577
Total	1,414,944	1,393,559
Elastomers, acyclic:		
Polybutadiene-acrylonitrile type (N-type)	45,244	36,351
Polychloroprene type (GR-M, neoprene)	180,308	147,269
Polyisobutylene-isoprene type (GR-I, butyl)	175,923	177,787
Polyvinyl type*	118,364	112,697
All other†	23,567	36,351
Total	543,406	495,324
Grand total	1,958,350	1,888,883

*Includes polyvinyl butyral, polyvinyl alcohol, and polyvinyl chloride elastomers. †Includes chlorinated rubber, polyisobutylene, silicone and thiokol elastomers.

Penn Crude Cut

South Penn follows lead of Tide Water in reduction

BRADFORD, Pa. — The price of Pennsylvania Grade crude oil was cut by 50 to 76 cents a barrel last week.

The reduction was looked upon by many as another indication that Penn Grade oil has virtually lost its premium position in the nation's crude-oil market. It also posed questions as to whether many of the area's marginal wells can be operated profitably at the lower crude price and whether drilling activity might decline sharply.

Tide Water Associated Oil Co. made the initial cut, a 76-cent drop to $3 a barrel for Bradford District oil on May 17. Sinclair Refining Co. met this reduction immediately.

On May 20 a 50-cent cut for all Penn Grade crude was announced by the Joseph Seep Purchasing Agency of South Penn Oil Co., biggest buyer in the area.

In announcing the action, George J. Hanks, South Penn board chairman, blamed a weak market for the oil. This, he said, was caused by continued accumulation of stocks since the first of the year and the fact that there has been only a slight reduction in the producing rate.

The South Penn action left these postings in effect:

. . . **Bradford District** oil in Bradford Transit Co., $3.26.

. . . **Bradford District** oil in National Transit Co., $3.26.

. . . **Middle District** Penn Grade oil in National Transit Co., $3.20.

. . . **Penn Grade** oil in National Transit Co. (southwest division), $2.81.

. . . **Penn Grade** oil in Eureka Pipe Line Co., $2.75.

The price cut was the second 50-cent reduction in 5 months, the earlier one having gone into effect on January 1.

Tide Water's action followed its announcement of plans to close its 87,500-bbl. refinery at Bayonne, N. J. The company buys about 4,000 bbl. of Bradford crude daily and moves it in its own lines to Bayonne. Tide Water already had quit buying Allegany District crude.

The Tide Water action was only the second instance in the last 10 years that a price change had been initiated by a company other than South Penn. Sinclair several years ago raised the price 50 cents and was later joined by the other buyers.

The Penn Grade price cut followed only a few days a statement by Hanks before a meeting of South Penn stockholders that the price of the area's crude already was too low and that attempts would be made to hold the market price "at the best possible level in line with the over-all picture."

Mathieson, Olin May Merge

NEW YORK.—One of the largest mergers in recent years is being planned by Mathieson Chemical Corp. and Olin Industries, Inc.

Directors of both organizations have approved the plan and agreed to submit it to their stockholders at special meetings June 29. The merged firm would be Olin Mathieson Chemical Corp. The combined corporation would have total assets of about $500,000,000, based on 1953 figures.

Mathieson is a large producer of petrochemicals and industrial and agricultural chemicals. It also produces drugs and pharmaceuticals through its subsidiary, E. R. Squibb & Sons. The company has 25 domestic and 16 foreign plants.

Olin Industries is the manufacturer of a variety of goods, including polyethylene, industrial explosives, and firearms. Its operations are carried on in 18 domestic plants.

Both companies were founded in 1892 and are about the same size. Each has approximately 18,000 employes.

Rubber Plant May be Built

NEW YORK.—Top officials of Continental Oil Co. and Cities Service Oil Co. are conferring here on plans to form a joint subsidiary for making butyl rubber.

The proposed firm, Petroleum Chemicals, Inc., will be licensed to employ Standard Oil Development Co.'s. butyl rubber synthesis processes at a plant presumed to be planned for Lake Charles, La.

While the principals will make no official statements, they are reliably reported to be considering a plant which will cost about $25 million.

Butyl rubber is sharing much interest currently with all synthetic rubbers in view of the Government's plan to sell its rubber manufacturing facilities to private industry *(see National Affairs)*. Some observers consider butyl, manufactured by the low temperature process, to have an excellent growth potential for inner tubes and other non-abrasive uses.

L.P.G. Consumption Doubles

WASHINGTON. — Consumption of liquefied petroleum gases more than doubled in the 5-year period ending in 1952, the Bureau of Mines reported last week.

In a study covering 31 years of L.P.G. sales, the bureau found that from 1947 to 1952 they increased from 2.2 billion to 4.5 billion gal. In 1922 sales totaled only 223,000 gals.

Approximately half of the 1952 consumption was for domestic purposes. Sales for 1952 domestic consumption exceeded 2,266 million gals., or more than the total sales in 1947, the bureau said. Other major consumers were gas utilities and synthetic rubber and chemical plants.

Work to Begin on Big Line

HOUSTON.—Tennessee Gas Transmission Co. has announced that work will begin on its 574-mile, 30-in., line from Kinder, La., to Portland, Tenn., about June 1.

The new line will begin at the company's compressor station near Kinder in southwestern Louisiana and will parallel the existing 24, 26, and 30-in. system through Louisiana, Mississippi and Tennessee before joining the system at a compressor station near Portland, Tenn., at the Tennessee-Kentucky state line.

March Gas Sales Increase

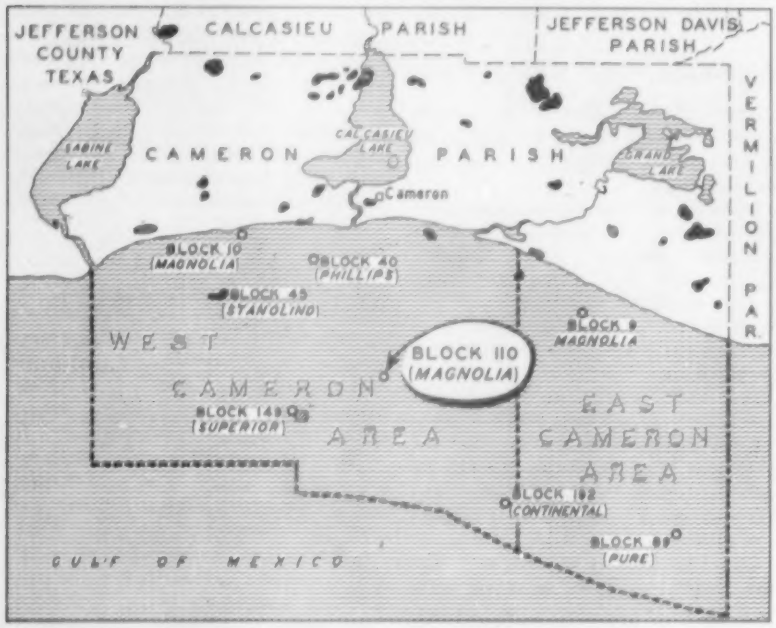
NEW YORK.—The American Gas Association reported that natural-gas sales in March totaled 5,534 million therms, 4 per cent higher than the 5,322 million therms sold in 1953.

The association also reported that natural-gas sales for a 12-month period ended March 31, 1954, increased 8.1 per cent to 54,695 million therms compared to a similar period ended March 30, 1953.

Industry Briefs

CORPUS CHRISTI.—The newly organized La Gloria Oil & Gas Co. has purchased assets of La Gloria Corp. in a $40,000,000 transaction. The new owners include the management and key personnel of La Gloria Corp. The company will maintain principal offices here, a division office in San Angelo, Tex., and district offices in Shreveport and Lafayette, La., and Denver.

BALTIMORE. — Davison Chemical Corp. has been merged with W. R. Grace & Co. through action by the boards of directors of both organizations. Davison will operate as Davison Chemical Co. Division of the Grace company and will continue to headquarter here.



Offshore Test Hits

Magnolia becomes first to find oil in federal offshore lands since settlement of tidelands ownership dispute

LAKE CHARLES, La.—Discovery of the first oil field on federally controlled lands in the Gulf of Mexico since settlement of the tidelands dispute was announced last week by Magnolia Petroleum Co.

The wildcat discovery, 18 miles off the coast of Cameron Parish, Louisiana, flowed at the rate of 406 bbl. daily on a 2-hour gage through an 11/64-in. choke. Gas-oil ratio was 720:1 and flowing pressure was 1,240 psi.

The well discovery is the 1-A Lease 1153, jointly owned with Continental Oil Co. and Felmont Oil Co. Magnolia holds a 50 per cent interest, Continental 37 per cent, and Felmont 12½ per cent. Together the companies hold about 12,500 acres around the discovery.

Production in the offshore wildcat is from Miocene sand. The test was through casing perforations at 8,143-50 ft. Previously the well, drilled to 10,628 ft., had tested gas and condensate in a deeper sand around 10,125 ft.

Location of the well is in Block 110, West Cameron area. It is about 10 miles northeast of a shut-in gas-condensate field in Block 149 discovered by Superior Oil Co. in 1949.

Drilling on the project was started last December 25. The leases were acquired from the State of Louisiana in 1947. Magnolia received from the U.S. Geological Survey on Noveember 10 a permit to drill "at its own risk" pending federal validation of the state leases.

Other activity . . . Operations now are under way or due to start shortly on three other deep tests on federal offshore lands in the West Cameron area and the adjoining East Cameron area.

One, a projected 13,500-ft. test now being drilled by a four-company group is about 15 miles southeast of Magnolia's discovery and about 34 miles offshore, in Block 162. Companies participating in this wildcat are Continental Oil Co., the operator, and Cities Service Oil Co., Atlantic Refining Co., and Tide Water Associated Oil Co.

Superior Oil Co. is drilling another well in its Block 149 field, 10 miles southwest of Magnolia's well. In the adjoining East Cameron area, Pure Oil Co. is preparing to drill in Block 69, about 30 miles offshore.

Closer to the coast, on state-controlled submerged lands, three wells are active: One by Phillips Petroleum Co. in Block 40, West Cameron area; and two by Magnolia, one in Block 9, East Cameron area, and the other in Block 10, West Cameron.

New Depth Record?

Humble preparing to test at 17,643 ft. in Louisiana

NEW IBERIA, La.—Humble Oil & Refining Co. may establish Louisiana's deepest producer, which also will be the world's second deepest well.

Humble has reached a depth of 17,643 ft. in its 1 Rita Provost Minivielle test on the northeast flank of Weeks Island dome, 15 miles south of here in Iberia Parish, and is preparing to run a string of casing to bottom of the hole.

If production is established at or near this depth, the well will be Louisiana's deepest and the world's second deepest producer. The well is the deepest of three in the immediate area which have been drilled to depths below 17,000 ft.

The two previously drilled tests, one by Humble and the other by Shell Oil Co., were completed in 1953 as Louisiana's deepest oil producers. One, Shell Oil Co. 1 Weeks-Gall unit, with bottom of its oil zone at 17,122 ft., for a short time was the world's deepest producer. Humble's deep producer, 1 Gonsoulin, ½ mile east, was completed with bottom of its oil interval 3 ft. shallower.

The world's producing depth record was shifted to North Coles Levee field, in Kern County, California, where, late last year, Richfield Oil Co. completed a gas-condensate producer at 17,892 ft.

FPC Authorizes Line

HOUSTON.—Transcontinental Gas Pipe Line Corp. has received Federal Power Commission approval of its proposal to build 57 miles of 30 and 36-in. line.

Transcontinental will parallel parts of its present system in Louisiana, Mississippi, and Alabama. The line, which will cost $6,533,000, will enable the company to maintain a transportation agreement with Sun Oil Co. at Sun's Marcus Hook, Pa., refinery and to meet previously authorized commitments.

Deep Gas Field Reported

ABBEVILLE, La.—Discovery of another deep gas-condensate field, 25 miles southwest of here in the White

Lake area in the tidal marshes of southern Vermilion Parish, is reported by Texas Crude Oil Co.

The company's 1 Albritton, in 11-16s-1e, rated good for 2,250,000 cu. ft. of gas daily through a 9/64-in. choke. A substantial spray of condensate, as yet ungaged, was noted in the gas flow. Production is from Miocene sand at 12,398-406 ft.

The well is approximately 5 miles north of the prolific Pecan Island gas-condensate field.

ROCKY MOUNTAIN

Microwave System Opened

COLORADO SPRINGS.—Colorado Interstate Gas Co. has inaugurated a microwave system of communications between its general offices here and some of its outlying compressor stations.

The network covers a total of 231 miles and provides instant, interference-free communication on two voice channels. The system is designed to carry a total of 24 voice channels.

The line begins a short distance from the company's offices here and serves four stations before ending at the Keyes, Okla., compressor station.

Line Gets Amortization

CHICAGO.—Oil Basin Pipe Line Co. has been granted accelerated amortization of 25 per cent on its planned products line from Laurel to Glendive, Mont.

The line, which is being financed by William H. Tegtmeyer & Co. of Chicago, will cost approximately $5,350,000 and have a capacity of 12,000 bbl. per day *(The Oil and Gas Journal, April 5, page 160)*.

Agreements for use of the 226-mile 8-in. line have been signed by Farmers Union Central Exchange which operates a 15,000 bbl. refinery at Laurel and Carter Oil Co. which operates a 25,000 bbl. refinery at Billings.

ALASKA

Phillips Test Dry

First wildcat on million acre block finds no shows

BARTLESVILLE, Okla. — The first wildcat test on a million-acre block of leases on the southern coast of Alaska last week was completed as a dry hole.

The well, the Sullivan Strat 1, went to 4,837 ft. without any significant shows of oil or gas. Location was 4 miles north of Icy Cape and 26 miles east of Cape Yakataga.

The wildcat was the first of several planned by Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc., which jointly hold operating rights on the huge lease block.

Location for a second test already has been staked 5 miles west and 2 miles north of the strat hole and will be spudded as soon as an access road is completed.

The million-acre lease block was assembled by William T. Foran and Ben G. Gellenbeck, and its acquisition by Phillips was approved early last year by Interior Secretary Douglas McKay. Kerr-McGee later joined Phillips in a 50-50 deal, in which Phillips would be operator and Kerr-McGee would do the drilling.

Under the contract through which it acquired the block, Phillips must drill 12 wildcats over a period of 10 years and must spend a minimum of $1,200,000 by June 30, 1956, and annually after that must spend a minimum sum equal to 40 cents an acre.

First personnel and equipment arrived in Alaska early last July to begin road and camp-building programs and to start geological work. The first test was spudded only recently.

New Twist In Engine Testing

RICHMOND, Calif.—A new wrinkle in engine cycling tests has been developed here in the laboratories of California Research Corp., a California Standard subsidiary.

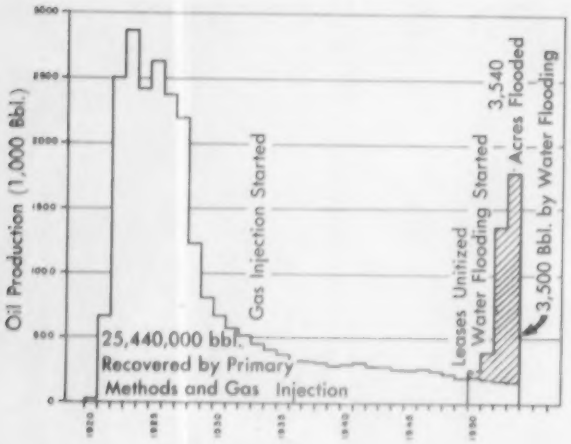
Electronic controls, actuated by a perforated 35 mm. tape harking back to the old "piano roll" principle, can take a test engine through all of the pertinent conditions encountered by an automobile or truck in actual road operations.

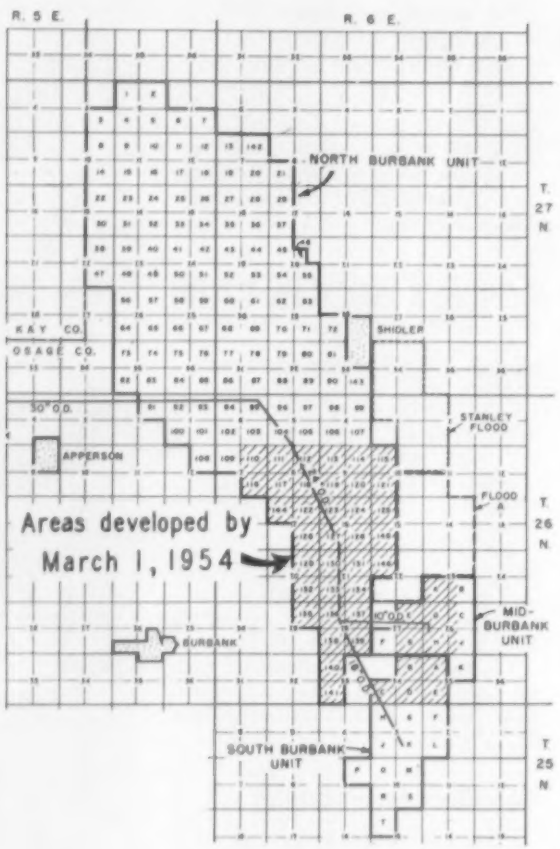
Cycling tests which vary load, speed, and other driving conditions have become standard in petroleum laboratories for evaluating engines, fuels, and lubricants. Normally, they are preset to simulate actual driving conditions. The new Cal Research device permits duplication of specific road runs as many times as necessary and without supervision.

One device, mounted on a stock car, records the engine's driving conditions and transmits the record to the tape in the form of perforations. The tape is "cut" with the proper time intervals for six variables: stopping, starting, speed, load, and oil and water temperature.

The tape is fed to an electronic control which comprises an electric eye actuating six switches controlling these variables. The laboratory control is roughly the size of an average filing cabinet. Control knobs and gages are mounted on the central panel. Hence an engine on a block can be made to perform exactly as it would in powering a car through any desired road circuit with no operator supervision.

Part of the crowd of 350 on the tour.


Oil Production (1,000 Bbl.)
Gas Injection Started
Leases Unitized
Water Flooding Started
3,540 Acres Flooded
3,500 Bbl. by Water Flooding
25,440,000 bbl. Recovered by Primary Methods and Gas Injection



Water-Flood Tour

Big group makes 1954 visit to three large projects in Burbank area, largest spread of floods in Mid-Continent

PAWHUSKA, Okla. — The Kansas-Oklahoma Water-Flooding Operators' annual tour of projects held this month included the three large operations in the Greater Burbank area, 15 miles west of here.

The Burbank water-flood "spread" is the largest in the Mid-Continent area. A detailed report of the operations was made to the inspection group of 350 by C. H. Riggs, petroleum engineer, U. S. Bureau of Mines, Bartlesville.

The Burbank water floods incorporate some of the newest and most modern equipment and operating innovations for this method of oil production. The water pipeline system serving the three fields is big—it's a 30-in. trunk line. The water has sulfate-producing bacteria present, but these are killed as they enter the pipeline.

At North Burbank gas engines power the individual pumping units. To even out the gas supply, sparse in winter months, a separate gas storage field has been fitted up, east of the oil pool.

Pool unit operated by—	North Burbank Phillips	Mid-Burbank Kewanee	South Burbank Phillips
Present water flood, acres	3,540	650	635
Producing oil wells	197	41	19
Water-input wells	166	37	16
Daily oil production, barrels	3,913	556	778
Increased oil over normal, barrels per day	3,113	464	653
Daily water production, barrels	35,326	3,441	9,854
Daily water injected, barrels	68,350	17,332	16,766

At Mid-Burbank, the individual pumpers are electrically powered. Aluminum transmission lines are used; lightning arresters, load capacitors, and automatic timers are installed at each well.

At South Burbank, water input well completions are carefully tested; various electrical surveys and spinner traverses are employed. Water entry "locators" of a dye type are run in the producing wells.

Of the three pools, North Burbank is the largest individual area, comprising slightly over 20,000 acres. It was discovered in 1920. Mid-Burbank, or the Stanley Stringer area, was developed in 1934-36. South Burbank was discovered in 1934.

Producing formations for the three big pools, all now being water-flooded, average about 50 ft. thick and lie at 2,800-2,900 ft. Porosity averages 15 per cent, permeability ranges from 5 to 400 md.

The water-supply system at Burbank is one of the largest of its kind. There are seven water wells, each 56 to 59 ft. deep, sunk in the gravel beds underlying the Arkansas River nearby to

the northwest. Two-stage turbine pumps can lift up to 35,000 bbl. daily per well. The trunk pipe line, known as the Ark-Burbank system, is 30 in. and 24 in. in diameter and will eventually be equipped to pump 300,000 bbl. daily.

The raw river water contains large quantities of sulfate-producing bacteria. These bacteria can react with sulfate in water to release hydrogen sulfide which in turn corrodes pipe and equipment, and thus releasing iron sulfide which can quickly plug the injection wells. The well plugging from the corrosion products has been stopped by killing the bacteria with quaternary aluminum compounds and chlorine.

New Reformer Due

First Ultraforming unit may be finished in May

EL DORADO, Ark. — The world's first Ultraforming unit is scheduled to go on stream, this month, at Pan-Am Southern Corp.'s refinery here.

The unit, being built by the Lummus Co., and licensed by Standard Oil Co. (Ind.), will have a throughput of 7,200 bbl. per day.

Ultraforming, the latest catalytic reforming technique, consists of a large furnace through which stock is passed at various stages of the process, four reactors containing platinum catalyst, and fractionating towers. *(The Oil and Gas Journal, Nov. 16, 1953, page 186.)*

The charge stock, a low-octane, dependantized naphtha, is combined with recycle hydrogen and heated in the furnace. This stream is passed through three reactors into a fractionating tower where the products, Ultraformate and fuel gas, are separated. A fourth reactor is used as a swing reactor to replace each of the others as they are regenerated. Catalyst is regenerated by a new technique which restores it to initial operating efficiency.

Because the unit operates at a low temperature, the Ultraformer is an ideal producer of benzene and toluene. Pan-Am officials have no present plans for further production of petrochemicals in addition to the tetramer and polybutene already produced.

Krout Reserve Revalued

LOS ANGELES.—The Krout field in Logan County, Oklahoma, which Macmillan Petroleum Corp. discovered early in 1953, is proving to be much smaller than anticipated.

W. Ross Cabeen, whose firm performs Macmillan's geological work on a consulting basis, made the disclosure at the company's annual meeting here last week.

Cabeen said a recent evaluation placed the field's crude reserve at about 1,500,000 bbl. Originally, it was thought the field might contain some 25,000,000 bbl. Cabeen pointed out, however, the field is not entirely developed.

Line Proposal Continued

TOPEKA.—The Kansas Corporation Commission has continued a hearing on an application by the Sunflower Pipe Line System until July 19 and 20.

Sunflower proposed to build and operate a 215-mile, 6-in. transmission line to transport liquid products gas from western Kansas to Wichita.

The continuance was ordered when attorneys for the company were unable to produce evidence which the commission considered essential for the hearing of the case.

Three companies, Warren Petroleum Corp., Santa Fe Railway, and Shallow Water Refining Co. of Garden City, Kans., all opposed the proposal.

Warren owns a fleet of tank cars which now carry products along the proposed route and Santa Fe handles the bulk of this tank car traffic.

CANADA

Gas Export Assured

Alberta Government OK's granting Trans Canada permit to build big line to eastern provinces, Minneapolis area

EDMONTON, Alta. — The Alberta government has approved issuance of a permit to Trans Canada Pipe Lines, Ltd., to export Alberta gas to eastern Canada and the Minneapolis area. A permit also has been approved for export of gas to Montana.

The Trans Canada permit allows the export of 4.35 trillion cubic feet of gas. The permit is for 27 years, 2 of which take care of the construction period. Gas must begin to move from the province by the end of 1955.

Cost of the line is estimated at $300,000,000, plus $200,000,000 for distributing and gathering systems and another $100,000,000 for processing plants to remove any gas constituents.

Premier Manning, who is also Alberta's minister of mines and minerals, said Trans Canada must prove by the end of 1954 that it will be able to finance the project. Construction is not expected to start until next spring.

Next step . . . Trans Canada's next step is to secure the approval of the federal board of transport commissioners in regard to route and economics. Before the gas can go to the Minneapolis area, a Canadian export permit must be obtained from the federal trade and commerce department. Also, the Federal Power Commission must give its approval.

The gas line to Minneapolis would branch off from the main line across Canada at Winnipeg. No delay will result while awaiting FPC approval, as federal Trade Minister Howe has insisted the line to Montreal must be built before gas is taken to the United States.

Plans are proceeding to pipe gas from Louisiana and Texas fields into the Toronto market by about November 1. This will help build a ready-made market for Alberta gas.

Gas has been exported from the Pakowki field in southern Alberta to Montana for the past 5 years under a temporary permit. The new permit to Canadian-Montana Pipe Line Co. for removal of 386 billion cubic feet for delivery to the Montana Power Co. is for 20 years.

Alberta reserves . . . The conservation board report showed that established Alberta gas reserves at March 31, 1954, stood at 11.5 trillion cubic feet, an increase of 1.9 trillion cubic feet over reserves 9 months previously.

Manning said Alberta's requirements of gas for a 30-year period are estimated at 4.6 trillion cubic feet. Plans are to keep 6.6 trillion as a cushion against any sharp rise in requirements. He pointed out that the 30-year availability of Alberta gas is a continuing period—not just a reserve from any set date.

In addition to gas reserved for Alberta and for Trans Canada, reserves of 11.9 billion cubic feet have been set aside to serve Dawson Creek, in northeastern B. C., 210 billion to the Pacific Northwest if and when this is approved by FPC and 22.5 billion to Montana.

Russia's Exports Rising

Stassen warns stepped-up Red oil trading may be aimed at splitting free nations; past record of underselling cited

WASHINGTON.—Soviet Russia may sell its oil throughout the world as part of a "peace offensive" aimed at splitting the democratic nations by demoralizing normal international trade.

Harold E. Stassen, Foreign Operations Administration director, sounded this warning this week after submitting a study of East-West trade trends to Congress. He outlined the steps taken by Russia during the past year to expand its world trade, noting that one of the "more interesting" commodities which the U.S.S.R. has begun to put on the market in bigger quantities is oil.

During the last half of 1953, Russia made agreements to ship about 3,500,000 metric tons (approximately 26,000,000 bbl.) of crude oil, kerosine, diesel fuel, and other products to Finland, France, Argentina, Greece, Italy, Iceland, Denmark, Sweden, Israel, and the Netherlands, the FOA reported.

The agency said if even two-thirds of the commitments are filled petroleum will be boosted ahead of lumber and furs and second only to grain among Soviet exports.

Export record . . . The report pointed out this is not the first Soviet venture in world oil trade. In the late 1920's, Russia began exporting large amounts of oil and by 1932 shipments had grown to 6,100,000 metric tons, or about 10 per cent of the world's oil exports and almost 30 per cent of Soviet oil production.

Bitter price wars with established oil groups followed this earlier entrance in the oil trade. The wars were aggravated by Russia's refusal to settle for oil properties seized after the revolution.

The Russian oil was withdrawn from the world market in the late 1930's. Oil exports trickled back following World War II, totaling 100,000 tons in 1951 and 250,000 in 1952. The exports climbed to 450,000 tons last year as some of the commitments began to be filled.

The war brought new oil resources to the Kremlin from Romania and the Soviet Zone of Austria. Exports to the West from these two sources amounted to 1,200,000 tons in 1951 and 2,300,000 tons in 1953.

Adequate production . . . The report said that although the Soviet bloc is short of certain specialized refined products that the nation probably has the oil capacity "to make considerable exports for at least some years." The report added that there has been no indication how strong the Russians will enter the export field or whether there will be any attempt to undersell other exporters.

The report added that no forecast can be made on "when the dictates of the Kremlin—economic or political—will override the dictates of the market plant and the oil will suddenly be whisked out of reach."

Expansion Outlined

Panhandle's $66,750,000 program presented to FPC

WASHINGTON.—Plans for a $66,750,000 construction and expansion program along its Texas-Midwest pipeline have been laid before the Federal Power Commission for approval by Panhandle Eastern Pipe Line Co.

The company explained the project, its second major expansion in 4 years, would include the substantial completion of its third pipeline along most of the main line of the system, construction of additional laterals, and the placing in operation of a huge underground storage field in Illinois. Completion of these facilities will enable Panhandle Eastern to deliver a peak of 1,425,000 M.c.f. of gas daily, an increase of about 50 per cent over its present peak-day capacity of 970,000 M.c.f.

Proposed construction . . . The application submitted to the FPC calls for the laying of almost 300 miles of additional pipe, the addition of approximately 40 per cent to the present compressor horsepower, and a drilling program of approximately 80 new wells for deep-lying natural gas in the Anadarko basin.

The underground storage project will be carried out on a 10,000-acre tract west of Wavefly, Ill., which has been under test since 1947. Wells are being drilled to about 1,800 ft. to St. Peter sandstone. The cost of developing the storage field is $5,171,500.

Costs . . . The company estimates the cost of additional loop facilities at $22,885,000, additional compressor power at $23,580,000, lateral lines at $3,686,000, and production and gathering facilities at $11,427,500.

Lease Vote Planned

Congress expected to get revisions to liberalize act

WASHINGTON.—Four bills liberalizing the Mineral Leasing Act to provide for concurrent development of oil and minerals on the public lands are being packaged into a single measure by a Senate interior committee to expedite their enactment before Congress adjourns.

During the past 2 weeks, the subcommittee has held hearings on the legislation, which calls for increasing the acreage limitations from 15,360 to 46,000 acres, extending the option period from 2 to 3 years, and raising the option limitation from 100,000 to 200,000 acres.

The amendments are supported by the Interior Department and by oil operators generally. Orme Lewis, assistant Interior secretary, pointed out the increase would be in line with present industry exploratory and development practices which require large acreage over which the expense can be spread. There is some question among department officials whether there should be any limitations on the acreage for exploration.

Lewis outlined the changes proposed in the new bill:

. . . A lease on which production has ceased will not expire if reworking or drilling operations are started within 60 days and continued with reasonable diligence.

. . . A lease with a well capable of producing oil or gas in paying quantities will not expire at the end of the term or an extension or suspension unless the lessee receives at least 60 days notice that he must place his well on a producing status.

. . . Holders of noncompetitive leases may apply for an extension of 2 years if the leases are on the structure of a producing field or 5 years if not on a structure.

. . . Leases affected by an agreement under which the Government and its lessees are compensated from oil or gas

drained on adjacent federal lands will be extended for the period during which such royalty is paid, and for 1 year from the end of such payments, and so long as there is production whether the lease is in its primary or extended term.

. . . **Cooperative or unit plan** leases will be eligible for extension.

. . . **Leases will automatically** be terminated when minimum royalty or rental payments are not made. Lewis said the automatic termination plan will supplant the present long, involved procedure and estimated the department will save $50,000 annually by the change.

FTC Order Hit

Indiana Standard reopens "Detroit" case, asks review

WASHINGTON. — Validity of the Federal Trade Commission's order in the so-called "Detroit case" was challenged last week by the Standard Oil Co. (Ind.).

The company questioned whether any valid cease-and-desist order is now in effect in a petition requesting reconsideration by the commission. Standard asked the FTC to review the findings reached last year to insure that they conform to the law before it submits them to the court.

The Detroit case was initiated by the commission some 14 years ago on charges that Standard had violated the Robinson-Patman Act in quoting lower prices to certain customers than it granted to other customers in the same class.

A cease-and-desist order, issued by the commission in 1946, was reversed by the Supreme Court in 1951 on the ground Standard had shown the lower prices were quoted in "good faith" to retain the favored customers. The court instructed the commission to make new findings on the issue of good faith.

The commission issued a revised order last year, submitting it to the Federal Court of Appeals at Chicago which returned it as not proper before that court.

The FTC has since sat tight on the theory it had issued a valid order. That left the next move up to Standard, which could sit tight also and force the commission to bring enforcement proceedings in the courts or could itself apply to the courts for review.

The company instead filed a petition for reconsideration with the commission.

Standard says the revised commis-

WATCHING WASHINGTON

Bertram F. Linz

Navy Pipeline Doubtful

The present Congress isn't stingy, but it views dimly any proposal to spend government money on projects which private industry might undertake.

As a result, Navy Department proposals for the construction of a pipeline out of the Elk Hills, Calif., naval petroleum reserve have met with a setback in the House armed services committee.

The committee has turned down the idea of a pipeline for which the Navy wanted $8,000,000 as a starter, as unwarranted competition with private industry.

The department is engaged in correcting the situation developed in Elk Hills by the migration of oil and the influx of water into oil-bearing sands. This will involve the drilling of possibly 39 wells, 22 of which already have been completed, and increasing production from 5,000 to 22,000 bbl. daily.

At the same time, the reserve is being kept in a state of readiness for the production of 100,000 bbl. daily, but while large production is possible no adequate provision has yet been made for the transportation of the oil.

The department contends that its returns from the naval reserves have nearly offset its expenditures on oil, including its now-terminated Alaskan exploration program. Since 1916, when it got the reserves, the Government has experienced a net loss of only $8,000,000 and could have shown a tidy profit had it opened up Elk Hills production.

Tanker Plan Progressing

If legislation can be enacted before Congress adjourns, the Navy will make a start toward replacing the T-2 type tankers with 25,000-32,000-ton, 18-knot supertankers.

Since the Navy's plan to get these tankers on long-term charters involves no additional expenditure, it is meeting with support in Congress.

The idea, designed to overcome any shortage of tankers available in the event of an emergency, is to put the presently operated T-2's in the reserve fleet and to use some 20 supertankers for current needs. The new tankers would replace approximately twice as many T-2's.

The Navy says that present construction of tankers in domestic yards is not producing the proper type of ship to provide for the necessary transition from the smaller, slower World War II type to the larger and faster vessels needed to meet operating conditions of the future.

The tankers would be built by private industry and the charter payments will come out of funds appropriated to the Defense Department for the transportation of fuel oil.

Trade Curb Plan Due

The Senate interior subcommittee investigating wartime availability of petroleum and other fuels is expected to come out for curbs on the reciprocal trade program and for the provision of greater support for the domestic oil industry.

The subcommittee is headed by Sen. George W. Malone of Nevada, a long-time foe of the Reciprocal Trade Act.

Malone believes that a free petroleum industry can keep this country supplied with liquid fuels indefinitely, for the near future by natural petroleum production, and for the long term by shale oil.

On the other hand, he has asserted, if the domestic industry is hampered by either the uncontrolled import of foreign oil produced at low cost or by excessive taxation, development of domestic resources could be so depressed that we would run out of oil and become substantially dependent upon foreign resources involving long ocean hauls which might not be protectable in the event of war.

It is anticipated Malone's report to the full committee will urge the abandonment of the reciprocal trade policy and return of tariff matters to Congress where, he says, they belong. It is his view, however, the Congress should not return to the "log-rolling" days of tariff determination, but should leave it to the Tariff Commission.

sion findings were designed to circumvent the court ruling which limited reconsideration to the single point of good faith. A third point raised by the company is whether the 1953 findings do not clash with the commission's own legal interpretations of the scope, meaning and purpose of the "meeting competition" defense. Standard charges, finally, that the commission failed to give proper weight to its own examiner's findings that the company acted in good faith in reducing prices.

Following the Supreme Court decision, several bills were introduced in Congress to write the good-faith defense into law but no action ever was taken.

Gas Import Bill Hit

Administration agencies battle bill by Wyoming senator designed to prevent imports of natural gas from Canada

WASHINGTON. — Legislation designed to bar the imports of natural gas from Canada ran into strong administration opposition last week.

The Federal Power Commission and Interior and State Departments expressed objections to a bill introduced by Sen. Lester C. Hunt of Wyoming to amend the Natural Gas Act. Hunt's bill would require the FPC to deny applications for the importation or exportation of natural gas "in any case where the commission finds that such exportation or importation will result in economic dislocation, unemployment or injury to any segment of competing fuel or transportation industries of the United States."

The bill also was opposed by the natural-gas industry, but had the strong support of senators and congressmen from the coal-producing states of Wyoming, Utah, North Dakota and West Virginia, the coal industry and the United Mine Workers of America.

An Interior Department report to the subcommittee stated flatly that the effect of the bill would be to put the FPC in a position "where it would probably be obliged to deny every application for the importation of natural gas" and charged it appeared to be designed to curb the export domestic gas solely to protect the market of competing fuels.

The FPC took the position that the public interest provisions of the present act are adequate and the State Department supported that position, declaring that enactment of the bill would place the U. S. in violation of the Canadian trade agreement.

There were indications also that congressmen from the fuel-consuming states viewed the legislation as potentially dangerous to their interests. Sen. John O. Pastore of Rhode Island pointed out that his state has just converted to natural gas and raised the question what would happen if domestic supplies of gas should prove inadequate at some future time and suppliers were unable to maintain their service by importing Canadian gas.

Proponents of the legislation took the position that natural gas and imported oil have cut deeply into coal output and contended it is not in the public interest to grant foreign gas the right to compete with domestic fuels and disrupt the market *(See page 120).*

Spokesmen for the natural gas industry contended that the Natural Gas Act already provides all the safeguards necessary for the protection of competing fuel interests from uncontrolled imports of gas and, in discussing the bill, characterized it as another attempt to dictate the end uses of gas.

At the present time there is only one permit outstanding for the importation of gas, held by the Montana Power Co. The company gets the gas from a Canadian subsidiary and its use is limited to industrial purposes.

Bidding To Close

Government will sell 25 synthetic rubber plants

WASHINGTON.—Bidding will close May 27 on 25 government-owned plants in one of the final steps to put the Government out of the synthetic rubber business.

Bids received by the three-man Rubber Producing Facilities Disposal Commission will not be final. They will be subject to negotiations for 7 months, when final disposition is scheduled.

Operators of the various plants—built during World War II as a defense measure—are expected to submit bids. The recent announcement of the possibility of locating a privately-financed butadiene plant in Texas may be reflected in the bidding for the eight government butadiene plants *(The Oil and Gas Journal, May 3, page 58).*

The eight butadiene plants and 13 copolymer plants are the principal facilities being offered by the Government. Also included in the bidding are two butyl rubber plants, one styrene plant, and a dodecyl mercaptan plant. Two plants that manufacture butadiene from alcohol also will be up for lease or sale. Petroleum is used as the base stock for the other butadiene plants.

The operators and locations of the butadiene plants are: Cities Service Refining Co., Lake Charles, La.; Copolymer Corp., Baton Rouge; Humble Oil & Refining Co., Baytown, Tex.; Neches Butane Products Co., Port Arthur, Tex.; Phillips Chemical Co., Borger, Tex.; Shell Chemical Corp., Torrance, Calif.; Standard Oil Co. of California, El Segundo, Calif.; and Sinclair Rubber, Inc., Houston.

The operators and locations of the copolymer plants are: Copolymer Corp., Baton Rouge; Firestone Tire & Rubber Co., plants at Akron and Lake Charles; General Tire & Rubber Co., Baytown; B. F. Goodrich Co., plants at Port Neches, Tex., and Institute, W. Va.; Goodyear Synthetic Rubber Corp., Akron and Houston; Kentucky Synthetic Rubber Corp., Louisville; Midland Rubber Co., Los Angeles; Phillips Chemical Co., Borger; U. S. Rubber Co., plants at Naugatuck, Conn., and Port Neches.

Onassis Quiz Sought

Congressman asks probe of Saudi Arabian tanker deal

WASHINGTON.—State Department investigation of the tanker agreement between the Saudi Arabian Government and A. S. Onassis was called for last week by Congressman Emanuel Celler of New York.

Celler charged that Onassis will eventually attain a monopoly on the transportation of Saudi Arabian oil under the agreement *(see International)*, which he described as "an attempt by Saudi Arabia to flout America interests."

In separate letters to Secretary John Foster Dulles and FOA Director Harold E. Stassen, Celler asked for State Department and Foreign Operations Administration interpretations of the agreement from the standpoint of national security and its monopolistic aspects.

Celler declared that the agreement will give Onassis an "absolute monopoly" in the transportation of all Saudi Arabian oil within a few years.

The consummation of the tanker agreement was disclosed last February shortly after the Justice Department revealed that Onassis was one of several persons indicted by a United States grand jury on charges of misrepresentation in connection with the purchase of surplus government tankers after the war.

Safe-Driving Tests . . .

. . . Make Safer Drivers

Kenneth B. Barnes

TULSA. — Dowell Incorporated recently has installed a safe-driving test program which is representative of the safer driving steps that have been made and are underway by oil and gas, and petroleum service companies.

Renewed safe driving work by the major oil companies and service concerns affords more positive assurance that they will push down their vehicular accidents to the absolute minimum.

The number of motor vehicles on U. S. highways has now skyrocketed to the total of 54,745,000. It is therefore urgent that the general public and all industrial organizations, including the oil and gas companies and petroleum field organizations and service concerns, require safe driving.

Dowell has set up its new safety program under guidance of a safety engineer, and has a carefully constructed set of safety-tests and safe-driving regulations. The company's need for safe driving is forcibly emphasized by the fact that it has more highway vehicular units (cars, trucks, and individually licensed trailer units) than it has employes. The concern has 1,580 full-time employes. Its highway vehicular units, including trailers, total 1,609. The company's vehicular equipment is scattered, as operations were carried on last year in 45 states and 6 Canadian provinces.

The amount of highway vehicular equipment maintained by oil-field service companies, in cementing, acidizing, electric logging, perforating, core analysis and similar oil country work is enormous. Safety precautions by these organizations are consistently maintained at a very high level, paralleling the safe driving and safety regulations of the oil and gas companies themselves.

Driving tests . . . Dowell started its driving tests and training the first of this year. Each driver receives his own individual tests, which require 30 to 60 minutes and include discussions and consultations with the safety engineer.

In the first test, the "Tele-binocular" instrument is used. A total of 15 eyesight tests are given, including usable vision, depth perception, color blindness, and peripheral vision.

Second is the "black vision" test, employing the night driving vision instrument. One purpose of this is to see the examinee's eyesight recovery following dimming of headlight glare received from an approaching car.

Another test device is the "pedal box." This tests the driver's reaction time in emergencies. In this, the driver is timed in hundredths of seconds from his release of the accelerator to his brake depressing action.

A "Road Test" also is given the Dowell drivers. The test has five major parts, and the parts have up to 13 separate "check points" each.

Why? . . . Safety men with oil and gas companies and service organizations emphasize absolute necessity of strict driving precautions for all, be-

TOP PHOTO: Labeled test equipment is (A) "Night Driving" vision instrument; (B) Telebinocular (gives 15 tests including usable vision, depth perception, color blindness, peripheral vision); (C) "Pedal Box" for reaction time tests; (D) traffic board, utilizing magnetized vehicles and signs to simulate various traffic situations (for discussion purposes).

BOTTOM PHOTO: Perry Arnot, Dowell safety engineer, passes driver authorization card, certifying successful driver tests, to C. S. Jones, Jr.

cause of these U. S. highway accidents for 1953:

- Injury accidents, collision with automobile 1,438,360
- Deaths, collision with automobile 14,890
- Deaths, by exceeding speed limits 13,870

Important rules . . . Safety experts always include these all-important admonitions, as regards safe driving:

1—Don't Speed. This is the predominant cause of accidents.

2—Don't Drive Too Close. Close spacing doesn't allow sufficient margin of safety.

3—Don't Drive When Fatigued, or When Not Fully Fit. In this situation, obtain relief, help, or rest; never continue driving.

Safe driver's code . . . Shell Oil Co., as one example of oil company practice, has a Safe Driver's Creed. This creed is being adopted by Dowell and similar driver's resolutions are also now in effect by other oil and gas companies:

"With full realization of my duty to myself, my family, my community, and my company, I hereby resolve at all times to follow the practice of 'Defense Driving' while operating an auto.

"I understand Defense Driving means yielding the right-of-way when, by all the rules of the road, the right-of-way is mine. This Defense Driving is an unbroken series of concessions to other drivers who are thoughtless, unskilled or ignorant of the hazards they create. This Defense Driving means a constant awareness of possible man-made or natural hazards and the determination to avoid such hazards without regard to personal inconveniences, irritating delays or legal rights."

ECONOMICS

Imports, Exports Dip

Products receipts decline while crude intake rises

BOTH imports and exports decreased in March. Data compiled by the Census Bureau of the Department of Commerce shows total imports averaged 1,128,000 bbl. daily in March compared with 1,145,000 bbl. daily in February. The decline of 17,000 bbl. daily resulted from a decrease in product imports of 86,000 bbl. daily, partially offset by a gain of 69,000 bbl. daily in crude receipts. Total imports increased 23,000 bbl. daily over March of 1953.

Increases were reported for receipts of crude from six of the countries normally shipping crude to the United States. The largest increase was for Venezuela, up 75,800 bbl. daily. This big gain raised the month's average for Venezuela to 385,200 bbl. daily, the highest level in recent years.

The only important decrease was reported for Indonesian crude on the West Coast.

Reported imports of crude from Kuwait include two cargoes that were loaded in Kuwait, but originated in the Neutral Zone. A cargo of 137,000 bbl. went to the West Coast and the other shipment of 111,000 bbl. was delivered to the Gulf Coast.

Imports of crude by Gulf Coast refiners totaled 1,029,178 bbl. for March, the largest monthly total since late 1949.

Residual fuel imports dropped from 482,800 bbl. daily in February to 391,600 bbl. daily in March.

Exports . . . The sharp decrease in gasoline exports in March was the major factor in the drop for total exports. Gasoline shipments averaged 42,100 bbl. daily compared with 83,600 bbl. daily in February and 80,800 bbl. daily in March 1953. Except for the abnormal period during the refinery strike in 1952, gasoline exports in March were at the lowest level since February 1951.

The decrease in lube exports can be accounted for in part by the fact that the February average was the highest since August 1942.

IMPORTS INTO CONTINENTAL UNITED STATES

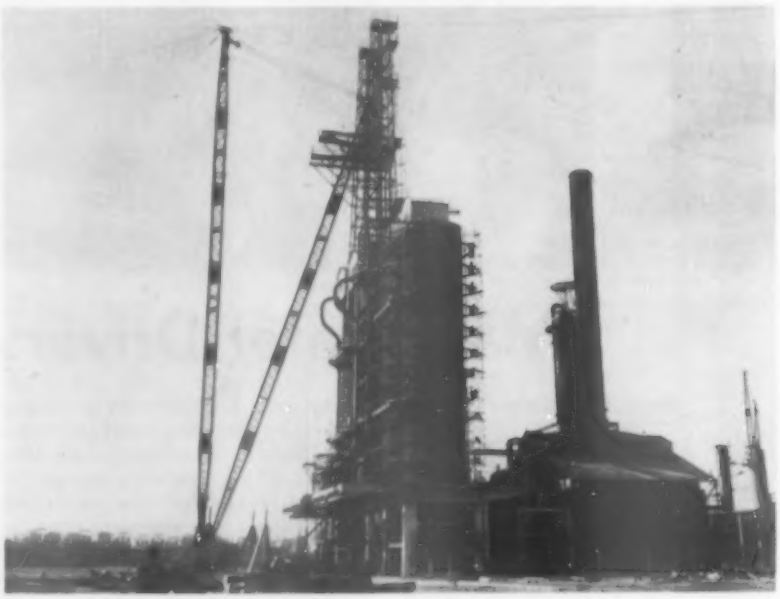
(Thousands of barrels)

	Mar. 1954	Feb. 1954	Mar. 1953
Crude—			
Mexico	796	280	133
Colombia	1,359	1,193	1,082
Venezuela	11,940	8,662	9,616
Trinidad	.....	112	.....
Ecuador	.....	90	.....
Kuwait	3,153	2,432	3,903
Saudi Arabia	3,018	2,271	3,268
Iraq	205	406	343
Qatar	416	278	593
Canada	130	193	205
Far East	666	1,726	1,078
Total crude	21,683	17,643	20,221
Daily average	699	630	652
Products—			
Residual fuel	12,141	13,520	13,102
Other products	1,162	897	930
Total products	13,303	14,417	14,032
Daily average	429	515	453
Total all oils	34,986	32,060	34,253
Daily average	1,128	1,145	1,105

EXPORTS*

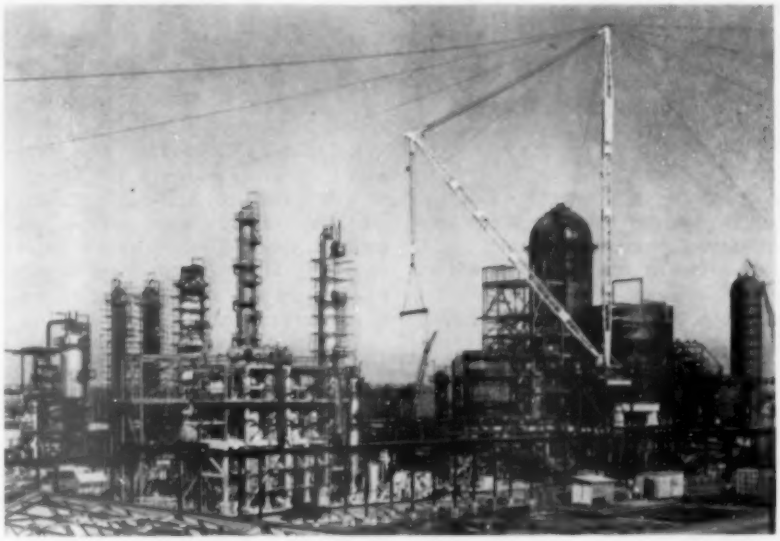
	Mar. 1954	Feb. 1954	Mar. 1953
Crude	873	795	2,171
Gasoline	1,306	2,340	2,504
Kerosine	563	609	727
Distillate	1,498	1,232	3,072
Residual	2,110	1,751	1,724
Lube oils	1,006	1,292	1,138
Other products	975	725	782
Total all oils	8,331	8,744	12,118
Daily average	269	312	391

*Excludes shipments to territories.



Refinery Skyline Getting New Look

Scaffolding and heavy cranes surround two delayed coking units under construction at Cities Service Oil Co.'s East Chicago, Ind., refinery. The two new cokers, adjacent to two present cokers, are a portion of a modernization and expansion program that is scheduled for completion this fall. The two new units will boost the refinery's coking capacity to 400 tons per day.



Watson Refinery Dedication Set

LOS ANGELES.—Dedication of new refining facilities, under construction for the past 2 years, and representing an outlay of $40,000,000, will be held at Richfield Oil Corp.'s refinery near here May 26.

The Watson refinery's crude throughput is being increased by only 20,000 bbl. to 140,000 bbl. daily. But as Charles S. Jones, Richfield president, pointed out in announcing the dedication, yield of premium-quality gasoline from each barrel of crude will be increased by about 20 per cent. Capacity for producing aviation fuels is being tripled, he added.

New equipment being placed on stream includes a fluid catalytic cracking unit which cost $17,300,000, has a charging capacity of 63,000 bbl. daily, and will produce gasoline components in the amount of 20,800 bbl. daily. Catalyst is to be circulated at the rate of 7,200,000 lb. per hour. A cyclone recovery system followed by the world's largest electrostatic precipitator will hold catalyst losses to less than 40 lb. hourly.

Also erected are a high-efficiency vacuum still of 60,000 bbl. capacity and a 2,000-bbl. catalytic polymerization unit. New equipment has nearly doubled the capacity of alkylation facilities. In addition thermal cracking units and an existing Thermofor cat cracker have been modernized and auxiliary equipment greatly improved.

In-Situ Slated In California

LOS ANGELES. — General Petroleum Corp. is planning to conduct tests for the first application of the in-situ combustion method of secondary recovery on the West Coast.

The technique was developed by Magnolia Petroleum Co., a General Petroleum affiliate. It is being applied in a pilot operation by Magnolia in Oklahoma *(The Oil and Gas Journal, August 10, 1953, page 68)*. The method calls for setting underground oil afire to drive hydrocarbons ahead of combustion to increase the output of surrounding wells.

The 700-ft. zone sand in the South Belridge area of Kern County has been selected as the site for the tests. Three core wells will be drilled to determine if the 700-ft. sand zone is present and if the tests can be conducted in the zone.

Miocene Development Slated

BAKERSFIELD. — Development of a 6,400-ft. Miocene sand discovered about 2 years ago in the Coalinga Nose field is being started following adoption of a voluntary unitization program.

Los Nietos Co. will serve as operator for the six companies participating in the new unit. All previously had unitized their holdings in the Gatchell sand unit.

Los Nietos, as operator, discovered the Vaqueros zone in May 1952, flowing through perforations at 6,383-6,445 ft., the 86V 18F rated a daily production of 790 bbl. of 38°-gravity crude. The well, however, has been shut in pending formulation of the unit plan.

The Vaqueros unit covers 1,360 acres, as compared with the approximately 3,000 acres in the Gatchell unit. Participating companies in addition to Los Nietos, a wholly owned Union Oil Co. subsidiary, are Standard Oil Co. of California, Superior Oil Co., Honolulu Oil Co., and The Texas Co.

Offshore Plans Announced

LOS ANGELES. — Richfield Oil Corp. is engaged in a geological survey of the offshore area along San Mateo and Santa Cruz county coast lines.

Western Geophysical Co. is doing the seismic work which will cover a distance of 45 miles between Moss Beach and Davenport and will extend seaward about 3 miles.

Paloma Fishing Continues

BAKERSFIELD, Calif. — Ohio Oil Co. has cleared drill pipe from the world's deepest well to a depth of 17,126 ft. and last week was washing over the remaining fish below 17,240 ft.

May 24 marks the 945th day since the deep test was spudded in the Paloma field 20 miles southwest of here and the 207th day spent fishing drill pipe which was stuck below 12,000 ft. after reaching a drilled depth of 21,482 ft.

It is expected wash-over operations will continue as long as reasonable progress is made. A final effort then will be made to recover remaining stuck pipe by jarring. Any not recovered will be abandoned.

While Ohio would like to recover the remaining drill pipe and core which had just been cut when the pipe became stuck, its immediate objective has been attained. That is to clear the hole to 17,100 ft. so a potential oil sand at that depth can be tested.

Blaze Damages Refinery

SANTA FE SPRINGS, Calif.—Fire which followed an explosion of undetermined cause at the Santa Fe Springs refinery of Rothschild Oil Co., caused damage estimated at $135,000.

Principal loss was more than 200,000 gal. of gasoline and diesel oil.

Safe-Drilling Tips

Big-scale safety program resulting from alliance formed by small contractors described during A.A.O.D.C. clinic

Robert J. Enright

DALLAS.—An experiment in South Texas is answering many of the safety problems of the small drilling contractor.

It is being conducted by the South Texas Safety Alliance, a group of small contractors who banded together last fall in an effort to solve their safety woes. The operators have from one to seven rigs.

During the ninth annual Drilling Safety Clinic staged here last week by the American Association of Oilwell Drilling Contractors, W. S. Fitzpatrick, Fitzpatrick Drilling Co., described how the small operators are enjoying safety programs similar to those of large drilling firms through the alliance.

Jumped financial hurdle . . . Fitzpatrick pointed out that the small operators have been interested in safety programs and training, but have been hampered since they generally cannot afford a safety specialist to direct such a program. Normally, the executive of the small firm directed the program himself, delegated the duties to another official—or neglected the safety program.

He said the South Texas contractors overcame the problem by meeting last fall with representatives of the Petroleum Extension Service of the University of Texas and organizing the alliance under sponsorship of A.A.O.D.C. Originally, six firms operating 21 rigs joined.

Two training specialists were assigned to work with the alliance by the Petroleum Extension Service. Beginning in November, the specialists provided these services:

. . . Bimonthly visits to reach rig, with safety meetings held when possible.

. . . Monthly meetings for supervisory and management personnel.

. . . Reports each month on the progress of each member.

By splitting the costs among themselves and the extension service, these services and others have been provided by the alliance.

Why some programs don't work . . . More than "lip service" from management is required for an effective safety program, Dr. Raymond H. Fletcher, Dallas psychological consultant, told contractors attending the clinic.

Even though management is sold on safety programs, two basic mistakes often can be made, Dr. Fletcher said. These are:

. . . Believing that "human relations are something which can be installed by administrative decision—like the installation of a heating system—then turned over to an engineer to operate."

. . . Assuming that "human relations have to do with surface effects."

Dr. Fletcher said the safety program without a basic interest in the employes is ineffective despite what preparations might be made for the organization and functioning of a program.

The properly organized program must be accompanied by an understanding of individuals and a keen enjoyment of working with them. This must begin at the top of an organization and spread out and down, he added.

Where you encounter this type of organization, you find its personnel not only taking care of equipment, but also keeping costs and accidents at the lowest possible minimum, doing an excellent job of maintenance, and doing an efficient job of making hole, he said.

Competitive urge helpful . . . One of the most effective adjuncts to a good safety program is stirring competition among personnel, Dr. Fletcher said.

He cited one contractor who gives each member of a crew a $150 watch or gift certificate if the whole crew goes for a specific time without lost accident time. The contractor saves enough in insurance premiums to pay for the gifts and also saves money due to less down time, he said.

An indirect benefit of such a program is that crew tenure is improved since a man hesitates to leave a crew which has accumulated time toward another $150 bonus, he said.

Fire-fighting suggestions . . . Recommendations for the type and location of fire-fighting equipment on power rigs were presented by the A.A.O.D.C. safety subcommittee.

The report was limited to drilling-rig fires as distinguished from oil-well fires. This selection was made, according to R. D. Leer, K. L. Kellogg & Sons, Compton, Calif., because a contractor can only administer "first aid" in the case of an oil-well fire, but can control fires resulting from backfires, exhaust sparks, electrical shorts, tool sparks, and similar fires.

The subcommittee recommended contractors adopt the dry-chemical type of extinguisher which discharges a powder. This powder generates carbon dioxide gas in the presence of heat,

WARNING AGAINST COMPLACENCE in safety work because of a good safety record was thrown out by K. L. Kellogg, of K. L. Kellogg & Sons, Compton, Calif., during the first general session May 13 of the ninth annual Drilling Safety Clinic of the American Association of Oilwell Drilling Contractors. Kellogg is president of A.A.O.D.C. Others at the speakers' table (left to right) are: W. W. Duncan, Loffland Brothers Co., Tulsa, presiding at the session; and Justin Wilson, of Justin Wilson & Associates, Baton Rouge, and H. H. Hillman, California Production Service, Inc., Long Beach, both speakers. Attendance at the 2-day clinic pushed 200.

lowering the oxygen concentration and smothering the fire. Leer said this type of extinguisher was chosen because of its flexibility in recharging at the location without special equipment.

The subcommittee recommended that four 30-lb. or five 20-lb. extinguishers be spotted around the rig. It favored the 20-lb. size be adopted. They should be placed near the cathead man's station, within reach of the driller, at the rear of the engines, at the light plant, and in the pump area where it is convenient to the mud tanks.

A liquid type of extinguisher, preferably of treated water, should be placed at or near the dog house for use on fires of general combustible materials. In addition to the extinguishers, the subcommittee advised that a 1-in. hose with a spray nozzle should be hooked to the mud system.

Injection Projects

Gas, water input program planned for Donnelly field

AUSTIN.—Eastland Oil Co. is seeking approval of the Texas Railroad Commission of a combined gas and water injection project in the San Andres formation of Donnelly field, Ector County, West Texas, which would increase recovery from the field by an estimated 3,100,000 bbl. of oil.

E. C. Rach, attorney for Eastland, said about 1,000,000 cu. ft. of gas daily would be injected through each gas-injection well into the high part of the San Andres structure. Water injection, which would begin later, would average about 300 bbl. daily per input well. The water would be injected around the edges of the field.

Rach said recovery from gas injection is estimated at about 600,000 bbl., and that from the water flood at about 2,500,000 bbl. He said about 80 per of produced gas would be injected.

Quien Sabe project . . . The commission also was asked to approve plans submitted by Killam & Hurd, Inc., for a unitization and pressure-maintenance program for all producing sands in Quien Sabe field, Webb County, Southwest Texas.

The proposed unit would take in 2,727 acres in the field—about 615 of them producing oil. The company plans to inject gas into the gas cap at an estimated pressure of 500 psi. and at a rate of about 500,000 cu. ft. daily per injection well. There are 54 wells in the feld producing from formations topped at an average 2,350 ft.

Additional oil recoverable was estimated at 1,000,000 bbl.

Testimony disclosed that 86.9 per cent of royalty interests have signed the unit agreement and that 12.9 per cent of the remainder have agreed verbally to do so. The company suggested that the agreement be approved retroactive to April 1.

Texas Allowable Up

Commission sets 17-day schedule for next month

AUSTIN.—The Texas Railroad Commission last week boosted permissible production of crude oil in Texas during June to 3,010,515 bbl. daily despite misgivings over the stock situation expressed by some companies at the monthly proration hearing here.

The initial figure for June represents an increase of 107,174 bbl. daily over the allowable initially set for May and a boost of 73,323 bbl. daily over adjusted allowable as of May 8.

The commission ordered 17 producing days for May, both for the state generally and for East Texas field. The increase in the allowable resulted from the fact that there is one less day in June.

Though Humble Oil & Refining Co. and Stanolind Oil Purchasing Co. took a dim view of any increase, most industry witnesses favored the 17-day pattern. Sun Oil Co. urged that an 18-day pattern be adopted.

Humble position . . . Humble's argument against raising the allowable was that crude stocks are increasing, gasoline stocks not declining as fast as normally, and that demand is running behind forecasts.

Testifying for Humble, Herman Pressler said the company's nomination for 16 producing days for June would hold its crude stocks at an adequate level and still leave it 10,000 bbl. a day for spot sales. He said the company had to add 400,000 bbl. to storage in May, bringing its total crude storage to just under 15,000,000 bbl. This, he said, is the top of the range Humble would like to maintain.

Humble, Pressler said, had computed the stocks of crude and major products on May 1 and compared them with figures given the commission as to ideal stock figures. In every case, actual stocks were near or above the highest figures given the commission, he said.

Gasoline, he added, is 10,000,000 bbl. above the highest desirable figure submitted by purchasers. Texas crude stocks, Pressler said, have gained 2,100,000 bbl. in 4 weeks.

In answer to a question by Commission Chairman E. O. Thompson, Pressler said the increase in demand has been leveling off and for the first 3 months of 1954 ran only 1.5 per cent above year-ago figures, as compared with a predicted increase of about 4 per cent.

Production, Property Sold

DALLAS.—Oil & Gas Property Management, Inc., has purchased 150 oil, gas, and condensate wells from Floyd L. Karsten & Associates, Pulaski and Rauch.

The wells, located on 11,800 acres in 31 fields in Texas, Louisiana, and New Mexico, have a production of 5,000 bbl. of oil and condensate, and 30,000,000 cu. ft. of gas daily.

Included in the sale are approximately 10,000 acres of nonproductive leases, various drilling rigs, workover equipment, compressor stations and dehydration plants.

Bexar Producer Completed

SAN ANTONIO.—What is rated as Bexar County's largest oil producer was completed last week as the discovery well of a new Austin Chalk field, located 15 miles southeast of here near the Wilson County line.

The well, drilled by B. M. Jacobs as 1 Hartl, flowed 267.3 bbl. of pipeline oil daily on a 24-hour potential gage through ¼-in. choke. Pay is in open hole 2,900-3,037 ft. Additional development of the new area already is under way.

Stanotex Plans Line

HOUSTON.—Standard Oil Co. of Texas is considering laying a 250-mile 6-in. products line from its refinery at El Paso to Albuquerque, N. M., a spokesman said here last week.

The line would cost about $4,000,000 and would have an initial capacity of 7,000 bbl. per day.

The Stanotex refinery at El Paso has a daily crude-oil charge capacity of 18,000 bbl., including 6,000 bbl. of thermal operations and 8,000 bbl. catalytic cracking.

Texas Sulfur Tax Upheld

DALLAS.—The Third Court of Civil Appeals has ruled that sulfur extracted from natural gas is subject to the state's sulfur production tax.

The ruling reversed a decision by the 126th District Court which held Phillips Chemical Co. was entitled to a refund of taxes it paid under protest on sulfur extracted from natural gas.

COMBINATION UNIT at Stanvac's new Durban, South Africa, refinery (Standard-Vacuum photo).

South Africa's First

Stanvac opens 17,300-bbl. daily Durban refinery to give Union of South Africa her first crude processing plant

SOUTH AFRICA'S first petroleum refinery, a 17,300-bbl. daily plant at Durban on the east coast, has been officially opened by Standard-Vacuum Oil Co.

The refinery was built by a Stanvac South African subsidiary, Standard-Vacuum Refining Co. of South Africa (Pty.), Ltd. It incorporates a combination unit which integrates the relatively new Model IV fluid catalytic cracking with atmospheric distillation and thermal reforming. Capacity in catalytic cracking is about 6,300 bbl. daily, and in thermal cracking, 2,000 bbl. daily.

The site is a 285-acre tract at Wentworth about 5 miles from the Durban docks. Saudi Arabia crude received at the docks of the Harbour Authority is moved by 20 and 24-in. pipeline to tankage about a mile away. The crude is then pumped through a 4½-mile, 10-in. to the refinery. The crude oil dock at Durban offers 40-ft. water depth.

The main unit includes the atmospheric still, thermal reformer, the catalytic cracker, and a combination column together with absorber and stabilizer. Crude passes through the furnace to the atmospheric column where it is cut into an overhead light naphtha and two side streams and a residue. The upper side stream—a naphtha cut—is passed to the thermal reformer, while the lower stream provides part of the charge for the catalytic cracking.

Residue from the atmospheric column, containing substantial charge stock for the catalytic cracker, is passed to the large combination fractionating column for stripping atmospheric bottoms to furnish further catalytic cracker charge stock, and it is also used as fractionator both for the reformer output and the catalytic cracker reactor.

Light gasoline produced in the first atmospheric pipe still is reheated and utilized as a stripping medium in the combination fractionator. Residue is passed to a vacuum still where it is stripped for asphalt manufacture while the vacuum side stream passes back into the charge stock of the catalytic cracking section. The absorber column is situated at the top of the fractionator to wash gases leaving the plant.

The main fractionator gives side streams, the lighter of which are further processed for commercial requirements or are utilized for cutting back and blending fuel grades. The heavier or bottom side of the stream can be passed back to the catalytic cracker section or to fuel.

All heater units and steam boilers are fired with refinery gas at present, and in the future, when the projected polymerization plant goes on stream and the C_3's and C_4's are extracted, there will be little surplus gas for flaring. The Wentworth refinery also operates a tinplate manufacturing plant and grease unit that were in operation prior to the refinery construction.

Construction of the refinery was carried out in 23 months. Foster Wheeler Corp. had the contract for construction and mechanical design. Process design was by Standard Oil Development Co. The refinery output can meet approximately a fifth of the current consumption of the Union of South Africa. It is one of three refinery construction projects of Stanvac which involve the investment of $100,000,000. The three will nearly double the company's refining capacity by mid-1955.

Portuguese Unit Will Open

A new 10,000-bbl. daily T.C.C. unit will be placed on stream this month. at the Cabo River refinery near Lisbon, Portugal, of S.A. Concessionaria de Refinacao de Petroleos em Portugal (SACOR).

The occasion will mark the completion of a modernization and expansion program in which crude capacity has been increased to 25,000 bbl. daily. The crude unit was brought into operation last November. The company is about a third owned by the government and has exclusive rights for refining in Portugal.

Shipping Pact Attacked

Arabian decree confirming agreement giving Greek tanker operator preference over other transporters draws fire

PUBLICATION of a royal decree confirming the shipping agreement between A. S. Onassis and the Saudi Arabian Government has been followed by further sharp protests against the alleged monopoly rights for the transportation of Saudi Arabia oil.

The decree was published in the government Gazette in Jeddah. It ratified the agreement which Onassis, the Greek-born independent shipowner and tanker operator, negotiated late last year giving him certain preferential rights on the shipment of Saudi Arabian oil *(The Oil and Gas Journal, February 22, page 126)*.

The decree made the agreement effective from April 9 and apparently removed any doubt that the deal had not gained the full sanction of the Saudi Arabian king.

Terms . . . Under the agreement, a tanker-operating company to be owned by the government and Onassis will have prior rights on moving all Saudi Arabia oil not transported in vessels of the four major oil companies owning Arbaian American Oil Co. For a tanker of one of the owning companies to qualify, it must have actually been employed in the Saudi Arabian oil trade before last January 1.

Protestants . . . The Chamber of Shipping of the United Kingdom strongly protested the agreement to the British Ministry of Transport. The British shipping organization said the agreement constitutes "a most flagrant example of flag discrimination," and will result eventually in a system of "one way traffic."

The London Economist attack the agreement as "deplorable and potentially dangerous to all international oil companies in the Middle East."

More details . . . A few additional details on the transportation operation to be undertaken under the agreement have come to light. Onassis, who has described himself as a "minority shareholder" in the new tanker company, will make available up to 30 modern tankers with a total tonnage of some 500,000 deadweight. Most of these have not yet been launched, so the effect of the agreement will be to gradually displace tankers other than those of the parent companies which were in service prior to the end of last year.

It is also reported that the new Saudi Arabian shipping company will later set up dry-cargo and passenger shipping services for carrying imports of pilgrims bound for Mecca.

Onassis earlier said that the Saudi Arabian Government would be paid a royalty of 21 cents a ton on oil carried. None of the reports on the agreement gave any definite information as to what rates would be charged by the Onassis-Saudi Arabian tankers. Oil men have pointed out that any attempt to charge over-the-market rates would quickly result in lost sales and lower oil production for Saudi Arabia.

TEMPLATE for Trinidad's first offshore well moored to a jetty.

Offshore Trinidad Test Readied

THE first high-seas marine drilling operation in the British West Indies colony of Trinidad is about to be undertaken off the southwest coast of the island by Trinidad Northern Areas, Ltd.

The well, 6 miles from the nearest shore point but 15 miles from the actual shore base, will be drilled from a 100 by 50-ft. platform supported on eight 24-in. piles. The piles will have to penetrate approximately 40 ft. of water and 63 ft. of soft mud before finding firm ground. The tubes through which the piles will be driven are 52 ft. by 33 in.

The template, or jacket, 100 by 50 by 25 ft. deep, will be erected and transported to the location inside "A" frames mounted on two 200-ton barges. After the piles are driven, they are trimmed for length, the jacket raised and clamped to the piles so that the derrick floor can be laid 17 ft. above high water.

Trinidad Northern Areas is owned equally by Trinidad Leaseholds, Ltd., United British Oilfields of Trinidad, Ltd., Royal Dutch - Shell and D'Arcy Exploration Co., Ltd. (Anglo-Iranian). The company has already spent approximately B.W.I. $8,000,000 ($4,700,000) in an unsuccessful search for oil in its land concessions in Trinidad. The location for the marine test followed seismic and gravity meter surveys.

Shell Loses Control

Indonesian Government will manage disputed facilities

THE Indonesian Government has announced it will place Royal Dutch-Shell properties in North Sumatra under direct control of the Indonesian Ministry for Economic Affairs.

Shell has been denied access to the area since the end of the war. Small make-shift operations have been carried on by local Indonesian groups, and at times the region has revolted against the central Indonesian Government.

Whether the properties should be returned to Shell or taken by the state

has long been political issue in Indonesia. Prewar, North Sumatra had a production of about 22,000 bbl. daily with an 18,000 bbl. daily refinery, much of it reported to have been burned by extremists in August 1947.

Reports from Dijakarta announced the government plans to appoint a coordinator to manage the properties. He will be charged with insuring efficient and profitable operation and raising the production level.

What effect the government's decision will have on future plans of Shell and Standard-Vacuum Oil Co. in Indonesia has not been revealed.

Iran Still Shipping

Idemitsu sidesteps Japanese Government ban on Iranian oil; British protest "broker" device used by marketers

DESPITE the fact that negotiations are under way in Teheran and an over-all Iranian oil settlement appears near, the National Iranian Oil Co. is continuing to make intermittent oil sales to independent Italian and Japanese buyers.

Idemitsu Kosan, the Japanese marketing company, has sidestepped its own government's ban on Iranian oil imports by contracting with the National Iranian to handle Iranian fuel oil on a broker basis. An Idemitsu official in Tokyo said Iranian oil would be transported to Japan, stored in Idemitsu's bonded tankage at Kawahaki near Tokyo, and sold in foreign trade and as foreign ships' bunkers.

Under this arrangement, the Iranian company would pay Idemitsu in dollars for transporting, storing, and selling the oil. The Idemitsu official said: "As we are not importing the oil for sale in Japan, we did not have to ask for the government's approval."

British protest . . . The British, whose strong protests against the Idemitsu shipments last year lead to the Japanese Government's prohibition against the controversial imports, took a less casual view of the new Idemitsu activity. A British Embassy spokesman in Tokyo said the unloading could be banned "under certain circumstances" and that he felt that the Japanese Government "had not exhausted all possibilities" of halting the movement.

Before this latest deal between Idemitsu and the National Iranian Oil Co., shipping reports indicated that two cargoes of Iranian oil were lifted in February. These were by the Nissyo Maru which carried 18,700 bbl. of gas oil and 142,000 bbl. of gasoline to Kawasaki for Idemitsu, and by the Salso which hauled about 72,300 bbl. of diesel to Venice and Trieste for Supor, the independent Italian firm. Since then, according to reports in tanker circles, four other ships have loaded Iranian oil, presumably for the same buyers. These movements brought to 24 the number of tanker loads of Iranian oil that have been exported since the nationalization.

Available information indicates that some seven shipments have been made since the first of the year from nationalized properties of Anglo-Iranian Oil Co., Ltd., the latest was in the Japanese tanker, Kiumaru, which loaded at Abadan early this month. The vessel was damaged shortly afterwards in a collision with a Norwegian ship near Bandar Shapur in the Persian Gulf.

Total shipment . . . Although amounts are not known on these later cargoes, the February shipments brought the grand total of oil exported from Iran since the nationalization to approximately 1,818,000 bbl., including 1,479,000 bbl. of products. About two-thirds of the total has been in products taken by the Japanese company.

Anglo-Iranian has asserted its legal claim to oil exported from its Iranian properties in the absence of compensation from the Iranian Government for the nationalization. Lawsuits have been initiated in both Japan and Italy, but with the discussions under way in Teheran, hearings have been postponed.

Australia Tests Set

Three wildcats planned for area in Central Queensland

THE next drilling in Australia's developing wildcat race will probably be entirely across the continent from the Rough Range discovery which gave Australians oil fever late last year.

The discovery started a rush for oil concessions in three Australian states and nearby Papua, New Guinea, but it appears the first venture to get under way will be that of Australasian Oil Explorations, Ltd., on Reid's Dome in Central Queensland.

Australasian has contracted with Petroleum Drilling Corp., Ltd., to drill three holes to basement rock on the dome situated on the Consuelo holding between Springsure and Roma. Petroleum Drilling, an Australian company, was formed with Santa Fe Drilling Co. of California. Jerald D. Robinson, Santa Fe president, is a director of the Australian company.

A rig left the United States in mid-May en route to the Reid's Dome area. Drilling is expected to be started in June or July with the Permian at about 7,000 ft. as the objective.

Ethiopian Tests Set

Sinclair to drill six or more wells by end of year

SINCLAIR PETROLEUM CO. is preparing to drill a series of shallow and medium-depth wells the second half of this year on its concession acreage in southeastern Ethiopia.

The company has shipped a portable rig from Houston to carry out the program. The rig has a number of special features especially designed for the Ethiopian operation. The company plans to complete six or more wells before the year's end.

The wells will be spaced at intervals of about 40 miles through the area around the locations of the two deep wildcat wells already drilled. These were Gumburo 1, which went to below 10,000 ft. 4 years ago, and the Galadi test, about 40 miles east of Gumburo, which was suspended below 9,000 ft. last year.

Third deep test eyed . . . The shallower wells to be drilled beginning the next month or two are intended both as exploratory tests and as wells for geological information. At the minimum, they will provide data on which to base the location of a third deep test.

The heavy rig remains standing at the Galadi location. A noncommercial show of oil was obtained in this well, and further testing may be carried out later this year. Additional equipment,

(Continued on page 447)

Let's take a look at . . .

A special section of
The Oil and Gas Journal

A FEW WORDS ABOUT

TEXAS...

"Center of Gravity of U. S. Oil Industry"

by Henry D. Ralph
Chief Editorial Writer

THE oil industry of Texas, like many other things in the Lone Star State, can boast of many "firsts," "mosts," and "biggests"—and can back up the boasts with dates and figures.

In reserves, wells, and production, Texas is 50 to 60 per cent of United States oil, and its share of other activities of the industry is of like magnitude. It is the center of gravity of the industry.

Texas has spawned hundreds of oil men, and not a few big oil companies, who have spread their activities to other areas of the nation and the world.

Texas was the proving ground for development of many methods and tools of exploration and drilling, of reservoir control and secondary recovery, of conservation and state regulation.

Texas has the biggest oil field on the continent and also the biggest gas field. It has more reserves than any other state, more producing wells, more productive areas, more refineries, more natural-gasoline plants, more miles of pipeline, more oil companies, and more independents.

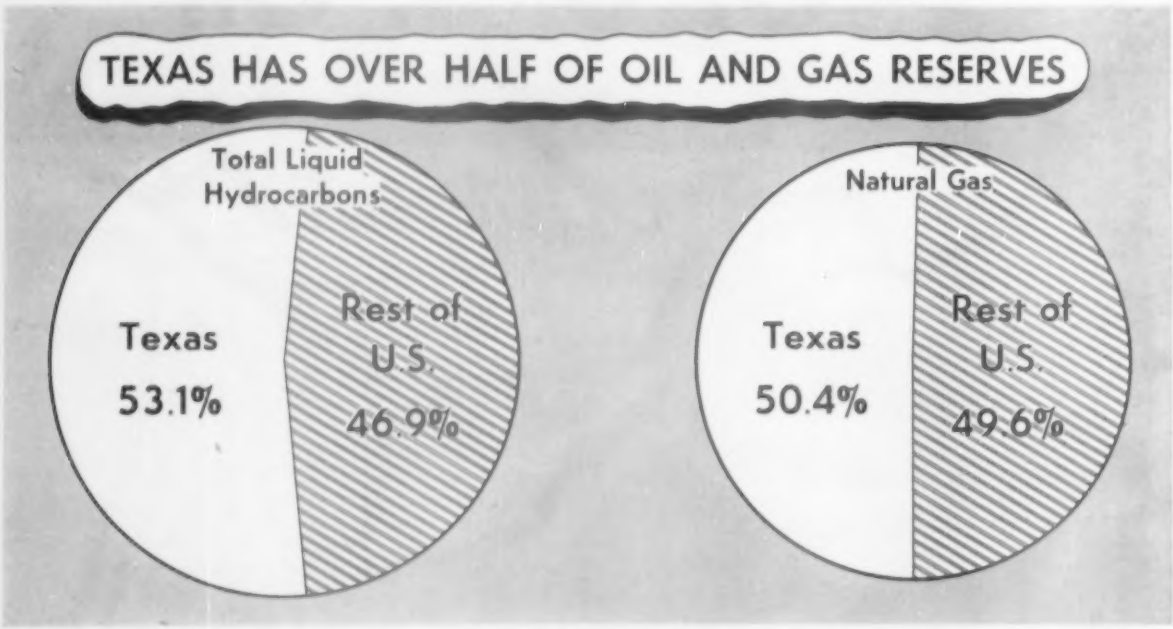
It even claims the longest oil history and the real birthplace of the oil industry in America. It seems to be well documented that in 1543 part of De Soto's expedition beached their ships near Sabine Pass and caulked the seams with pitch from the oil seep, thus establishing Texas as the site of the first commercial use of petroleum in the new world.

Texas also has an equally valid claim to being the first exporter of oil, based on the fact that in 1832 a German traveler scooped up a barrel of oil from a spring near Nacogdoches and shipped it back to Germany for medicinal uses.

Oil seeps and springs were known by the Indians and early settlers in many parts of what is now Texas, and some of them were exploited as health spas and mineral baths. One Texas booster, promoter of a Gulf Coast resort, described his scummy pond and gaseous spring as a "lemonade fountain."

Starting about the time of the Civil War and for two decades thereafter, numerous attempts were made to capitalize on the oil and gas seeps which made their way into springs or shallow water wells. Historians of the state claim several oil-industry "firsts" for these ventures, but none of them was long lived or commercially successful.

Eastern geologists didn't think much of Texas. They had the idea that oil was associated with rocks, creeks, and mountains—topographic features which are notably inconspicuous in the Texas landscape. Besides, Pennsylvania and Ohio were supplying all the kerosine, axle grease, and cylinder oil the world



GULF OIL AT PORT ARTHUR—1901 AND 1954: 100 BBL. PER DAY TO 275,000 BBL. PER DAY

could use so the market demand for Texas crude was substantially nil.

Oil as a commercial business got its first real foothold in Texas at Corsicana in the 1890's. The man responsible was J. S. Cullinan, a true pioneer of the oil business and actually the founder of two major oil companies—Magnolia Petroleum Co. and The Texas Co.

Utterly untypical of Texas was this beginning of the oil industry at Corsicana. Probably no other field in the entire history of the state was discovered and developed with less flurry and fanfare.

The city fathers contracted for some deep water wells in 1884, but a troublesome showing of oil was encountered at 1,027 ft. However, the contractor finally managed to case it off (first successful casing job in Texas) and complete the wells for good flows of artesian water.

But these same city fathers, being farsighted Texans, wanted to do something with this oil. So they formed the Corsicana Oil Development Co. and made a drilling and financing deal with J. H. Galey and J. M. Guffey (first successful farmout in Texas). Guffey and Galey were a famous team of Pittsburgh wildcatters who, at Spindletop a few years later, founded what turned into Gulf Oil Corp.

By the end of 1896 the Corsicana company had five successful oil wells and produced 1,450 bbl. of oil that year, and in 1898 there were 100 wells producing an average of 12½ bbl. per day.

These wells were drilled with a crude type of rotary rig which had originated in the Dakotas for drilling water wells, so Corsicana can claim to have introduced rotary drilling to the oil industry.

The only trouble with Corsicana oil was that nobody wanted it. A little was used locally for fuel as crude oil, some went to manufactured-gas plants in other Texas cities, and some was shipped by tank car to Ohio refineries where it was made into kerosine which Standard Oil Co. sold back to Texans.

The Texans didn't care much for this arrangement. They wanted their own refinery.

So the Corsicana developers wrote a letter to J. S. Cullinan. Cullinan had worked in all departments of Standard Oil, but at that time was an independent operator in Pennsylvania. He was about to take a trip to California anyway, so he consented to stop off in Corsicana for a look-see. He never got to California.

Cullinan contracted to buy 150,000 bbl. of crude for 50 cents a barrel, laid plans for a refinery, and went back East to raise capital. But the only interested investors he could locate were some of his old associates in Standard, who thus became silent partners in an independent company which competed with Standard for a good many years.

The 500-bbl. refinery of J. S. Cullinan Co. went on stream on Christmas Day 1898. There had been teakettle refineries of a sort in Texas before that, but Cullinan's was the first complete refinery and the first one to be a permanent financial success. Another first for Corsicana.

Cullinan achieved some other firsts in Corsicana. He induced the Cotton Belt Railroad to burn oil in its locomotives—first railroad use of fuel oil. He induced the city of Corsicana to spread oil on its dirt streets to lay the dust—first black-top streets in the Southwest. And he merged his refining company with the original producing company into Corsicana Petroleum Co. to explore for additional oil reserves—first integrated oil company in Texas.

But the Spindletop excitement was too much for oil-man Cullinan. He pulled up stakes in Corsicana and went to Beaumont in 1902 to found The Texas Co.

Meanwhile the Corsicana company prospered and expanded, getting in on several of the oil plays in North and Central Texas. It went through several reorganizations and name changes

THE TEXAS CO.'S PORT ARTHUR WORKS . . . 1904 AND 1954

and in 1911 became Magnolia Petroleum Co.—reportedly because one of the directors happened to see a magnolia tree in blossom outside the window.

Magnolia and its predecessors were not a subsidiary of Standard Oil, but in all of the reorganizations and expansions various Standard officials increased their personal investments in the company and continued to hold them after the Standard Oil trust was broken up in 1911. In 1925 Standard Oil Co. (N. Y.), in need of additional crude supplies and a stake in the Southwest, merged with Magnolia through an exchange of stock, and "Mag," though still a separate corporation, is now an affiliate of Socony-Vacuum Oil Co., Inc.

This article isn't a history of Texas oil, but we can't talk about firsts and mosts without saying a few words about Spindletop.

Several books and innumerable articles have been written about Spindletop, and all of them abound in superlatives.

Spindletop is where oil became an industry. It changed the course of world history, brought on the second industrial revolution, and catapulted Texas into the center of the world's oil industry.

Spindletop was the first really significant oil discovery west of the Mississippi, the biggest oil reserve the world had ever seen. It had the biggest gushers and the most gushers, created the greatest excitement throughout the world, and caused the most frenzied boom of any oil discovery in history.

Spindleton was the birthplace of new geological theories on the occurrence of oil, the birthplace of new drilling and producing methods, and the birthplace of hundreds of oil companies—some of which have since grown to greatness.

Spindletop came about because Patillo Higgins, a Beaumont real estate man, thought that the oil and gas seeps around the low hill which rose from the flat lands just outside the town must indicate the presence of a big oil reservoir. He taught himself enough geology to evolve the theory that a column of salt rising from great depths, pushed up layers of rock to form both Spindletop mound on the surface and a great oil trap beneath it.

Many professional geologists scoffed, but Higgins formed a company which bought land on the mound and drilled some wells. Quicksand and other technical difficulties prevented the wells from going as deep as Higgins said oil would be found, and his money ran out.

So Higgins made a lease and purchase-option contract with Capt. Anthony F. Lucas, a mining engineer who had drilled for salt on similar domes in Louisiana. For financing, Lucas turned successfully to Guffey and Galey, the Pittsburgh wildcatters. On their advice he hired as drillers the Hamill brothers who had learned rotary drilling at Corsicana.

Quicksand bothered the Hamills, too, but they developed a method of driving and washing down casing—and thus established a milestone in drilling methods.

Plain water had always been used in rotary drilling up to then, but the Hamills thought that a heavier fluid would be better in bringing up rock cuttings and protecting the hole, so they drove cattle through their water pond to stir up some mud—and thus drilling mud was presented to the oil industry.

The Lucas well blew in over the crown block on January 10, 1901, flowing an estimated 100,000 bbl. per day from a total depth of 1,020 ft.

This was more oil than anybody had ever seen, and in a matter of days Beaumont was overflowing with oil men, investors, promoters, gamblers, suckers, adventurers, millionaires, and riff-raff.

Land was cut up into rig-sized leases, and derricks were so thick that the mound was called the "onion patch." Within a year Spindletop had 138 gushers flowing wide open. Oil ran all over the ground, and there were several disastrous fires. So a committee of operators drew up a set of safety and conservation rules—the first field rules in the history of the oil industry.

Spindletop was producing more oil than all the rest of the country combined, and the price of crude dropped to almost nothing. Pipelines were quickly laid to ocean terminals, and within

"Texas' 'firsts,' 'mosts,' and 'biggests' didn't stop with Spindletop. Its oil industry kept right on growing—confounding experts by finding oil where theories said there was none. . . ."

a year after the Lucas discovery, Texas oil was in all the markets of the world.

Guffey and Galey, backed by the Mellon banking interests of Pittsburgh, immediately started a refinery near Port Arthur under the name of Guffey Oil Co. The name was soon changed to Gulf Refining Co., and this was the start of the now world-wide Gulf Oil Corp.

J. S. Cullinan hurried down from Corsicana to buy Spindletop crude at 3 cents a barrel and sell it up North and abroad. His former financial backers in Standard Oil did not join him, but with the aid of Texas and eastern capital he quickly built pipelines and storage tanks, chartered ships and barges, and pushed the sale of fuel oil for railroads and industries. By early 1902 his interests were reorganized as The Texas Co.—then as now interested in all branches of the industry wherever oil might be found or sold.

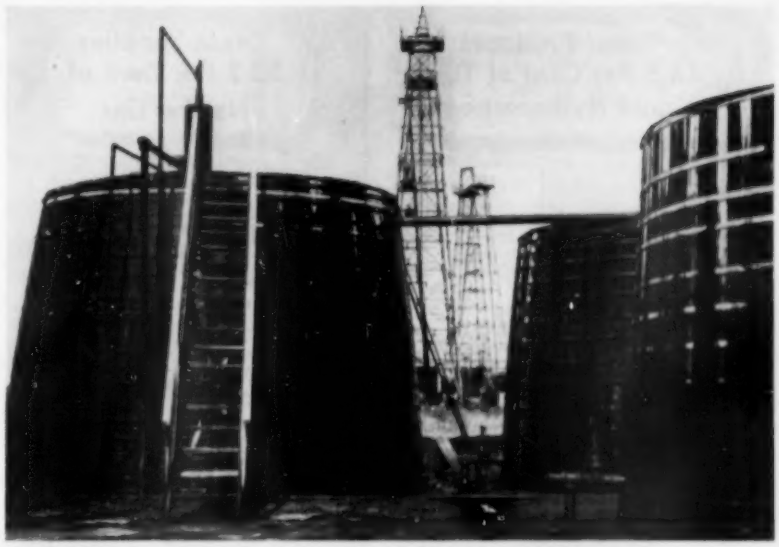
Up in Toledo, Joseph N. Pew was running a little refinery under the name of Sun Oil Co. The day after the Lucas gusher blew its news around the world, Pew sent a nephew to Beaumont who reported that here was a wealth of oil not controlled by Standard. A month later another nephew, J. Edgar Pew, moved to the new world center of the oil industry and bought a site for a loading dock at Smith's Bluff. Uncle Joe quietly bought a refinery site on tidewater at Marcus Hook, Pa., and began construction of a refinery there before he had an interest in a barrel of Texas crude. Then in May 1902 a Beaumont producing and crude-purchasing company which had overextended itself was put up at bankruptcy sale and J. Edgar bid it in. From then on, Sun Oil and Texas oil grew big together.

Shell Trading & Transport Co., a British firm, had a world-wide shipping and import-export business, but no oil interests. But it began moving Spindletop oil all over the world for the accounts of others. This looked like a good business to get in on. Also, Spindletop made it look as though the oil business was here to stay and that fuel oil would be better for ships than coal if Shell could be assured of a good supply. So the parent of the present Shell Oil Co. entered the oil business via Spindletop, first as a broker and transporter and then, a few years later, as a marketer and producer in various parts of the United States.

Standard Oil Co. kept away from Spindletop for a while, partly because it had just lost an antitrust bout in the state courts and was not very popular in Texas at the moment. But the lure—or the threat—of Spindletop was too great, and Standard moved in quietly with a refinery at Beaumont which began operating in 1903. At first this was known as the Burt refinery, then as Security Oil Co., and later was operated by the successors of the old Cullinan company at Corsicana. When Magnolia Petroleum Co. was formed in 1911, the Beaumont refinery became one of its properties.

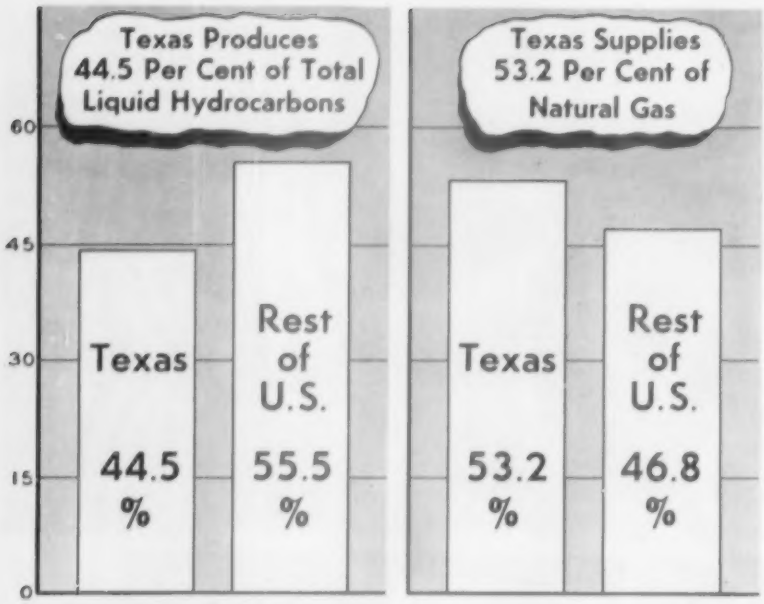
The part of Standard Oil which later became Standard of New Jersey also has roots in Spindletop, but indirectly. Several young independent operators at Spindletop, including William S. Farish who later became president of Standard Oil Co. (N. J.), were loosely associated in their business dealings there and also at several of the other plays which quickly followed along the Gulf Coast.

One of these plays was in a small field near the village of Humble, Tex., and in 1911 these associates pooled their interests into a corporation known as Humble Oil Co. Other operators and properties were brought into the amal-



Humble's early-day storage on the Gulf Coast and Pure's modern loading dock at Nederland

"It's hard to mention any phase of the oil and gas industry which didn't either originate or get its first real workout in Texas. . . ."



"East Texas taught the world the beginnings of conservation and the science of reservoir control. . . ."

gamation, and in 1917 the firm was expanded and reorganized as Humble Oil & Refining Co. During World War I, Bill Farish, vice president of Humble, served on the War Service Petroleum Board with A. C. Bedford and Walter C. Teagle, top officials of Jersey Standard, and they became good friends. After the war Humble needed capital and Jersey wanted an interest in the Southwest (Magnolia was tied up with Standard of New York which by that time was a strong competitor of Jersey). So Jersey bought into Humble, and Humble now is Jersey's largest producing affiliate in the United States.

Many other companies also had their beginnings at Spindletop, but they must remain unmentioned in this account—with one exception. In the maelstrom of wheeling and dealing, of rumors and ignorance that was Beaumont in 1902, a little oil paper was started, entitled The Oil Investors' Journal, and pledged to "tell the truth about the oil industry." It, too, had its early troubles and vicissitudes but it survived where others failed, and in 1910 it was reorganized as The Oil and Gas Journal, otherwise sometimes known as the Oil Man's Bible, the Big Yellow Book, and the largest publication of any kind in the world.

Texas' "firsts," "mosts," and "biggests" didn't stop with Spindletop. Its oil industry kept right on growing—confounding the experts by finding oil where theories said there was none; developing new methods of drilling, producing, and processing; and boosting small enterprises to huge corporations.

It's hard to mention any phase of the oil and gas industry which didn't either originate or get its first real workout in Texas—whether geophysics, rock bits, gas recycling, unitized operation, long-distance gas transmission, petrochemicals, or proration and state control.

The first state regulation of the industry was enacted by the Texas Legislature in 1899 to curb abuses in the Corsicana field. It required operators to case off water sands and plug abandoned wells, and prohibited flaring of gas wells.

State regulation had a thorny and variegated history, but its most hectic period was during development of the fabulous East Texas field in the early 1930's. For several years the Railroad Commission, legislature, courts, and operators engaged in a free-for-all over drilling and production in East Texas. So great was the confusion that within the space of 2 years the Texas Legislature reversed itself twice, enacting an Antimarket Demand law in 1931 and a Market Demand law in 1933—with martial law and 10-cent oil intervening.

East Texas taught the world the beginnings of conservation regulation and the science of reservoir control. It brought the first knowledge of stratigraphic traps, natural water-drive reservoirs, maintenance of bottom-hole pressure, disposal of salt water by injection into the reservoir, market-demand proration, and many other lessons.

East Texas also brought the oil industry its first and (so far) only period of federal control (1933-35)—another first, if dubious, distinction for Texas.

Conservation didn't begin or end in East Texas, by any means. In fact, Texas gave the world a demonstration in unitized operation as early in 1929, when developers of Van field unitized almost from the discovery. In Van, and later in many other Texas fields, unitization has worked smoothly and profitably for many years, but unitization is still a fighting word among Texas oil men.

Today's Texas is still the undisputed first in oil and gas. It produces oil from 196 of its 254 counties. It has about 4,000 fields (new ones are being discovered every week) and at last count it had over 148,000 producing oil wells.

Up to January 1, 1954, Texas had produced a cumulative total of more than 16 billion barrels of crude oil—almost twice as much as its nearest rival (California) and 35.2 per cent of the nation's total production since the Drake well came in.

Currently Texas is producing about 2,800,000 bbl. of oil per day, which is about 42 per cent of the United States total.

Texas has proved liquid hydrocarbon reserves of 18,265,862,000 bbl.—53.1 per cent of the nation's total, and its proved gas reserves of 106,529,626 M.M.c.f. are 50.4 per cent of the nation's.

Last year Texas drilled 17,003 wells—34.5 per cent of the 49,279 completed in the whole country, and 39.6 per cent of total footage. This included 5,245 wildcats—47.4 per cent of the total. The 1,096 rotary rigs running in the state (42 per cent of the nation's total) last year drilled 14,895 miles of hole beneath the sovereign soil of Texas—equivalent to almost two times through the earth.

Texas' 30,000 miles of trunk pipelines (more than one-third of the nation's total) send Texas oil on its way to the marts of the entire civilized world—much of it by way of Texas' own refineries.

". . . And never underestimate the value of Texas' natural gas (Texans did at one time, to their sorrow, but are trying to overcome their error)."

". . . But by any measurement Texas' oil and gas is just about the biggest anywhere."

As a refiner, Texas carries almost as much weight as it does as a producer. Its 64 refineries—far more than any other state has—are one-fifth the total number in the entire United States. Not only that, but the average size of Texas refineries is 36,450 bbl. per day—which makes Texas refineries 42 per cent bigger than the average for the United States. Texas refineries have 27 per cent of the crude capacity of the nation (2,332,907 bbl. per day), and 27.6 per cent of the catalytic cracking capacity (782,507 bbl. per day), and currently they are running 1,957,000 bbl. of crude daily—28 per cent of the nation's refinery runs.

And never underestimate the value of Texas' natural gas (Texans did at one time, to their sorrow, but are trying hard to overcome their error.) Last year Texas marketed 4½ trillion cubic feet of gas—53.6 per cent of all the natural gas sold in the entire United States. But before letting others have its gas, Texans squeeze most of the valuable hydrocarbon juice out of it by running it through 204 natural-gasoline and cycling plants—41.4 per cent of the nation's total number—and thereby producing 450,000 bbl. per day of liquid products—57.2 per cent of the nation's total. The biggest of these cycling plants—Katy—is also the biggest in the world.

Even more figures could be cited, but by any measurement Texas' oil and gas industry is just about the biggest anywhere.

With so much of the most in all matters petroliferous, it is only natural that Texas has more oil men than any other state. Not only did scores of companies start in Texas and grow to greatness, but other big companies which started elsewhere moved into the state and grew bigger because of it. And Texas has bred thousands of independent operators, some of them small by Texas standards, some big by any standards, and it is unfortunate that in the eyes of the East some of their occasional profligate spending sprees are better known than their many solid but little-publicized contributions to the welfare of their communities.

Texas' oil pays more than half the state's governmental budget. It has largely financed most of the state's many fine educational institutions, many of which are doing outstanding work on research into oil and gas problems and training a new generation of scientific oil men who go into oil operations throughout the world. Directly or indirectly, Texas oil is responsible for the growth of Texas' many prosperous cities.

The gregarious Texas oil men have formed themselves into many associations to further their objectives and improve their lot. Among the statewide and nation-wide industry groups headquartered in the Lone Star State are the Texas Mid-Continent Oil and Gas Association, American Petroleum Institute Division of Production, American Institute of Mining and Metallurgical Engineers Petroleum Division, and American Association of Oilwell Drilling Contractors, all in Dallas; the Petroleum Industry Electrical Association; National Association of Corrosion Engineers, and Petroleum Equipment Suppliers Association, in Houston; and Texas Independent Producers and Royalty Owners Association in Austin—not to mention many regional associations of Texas oil men.

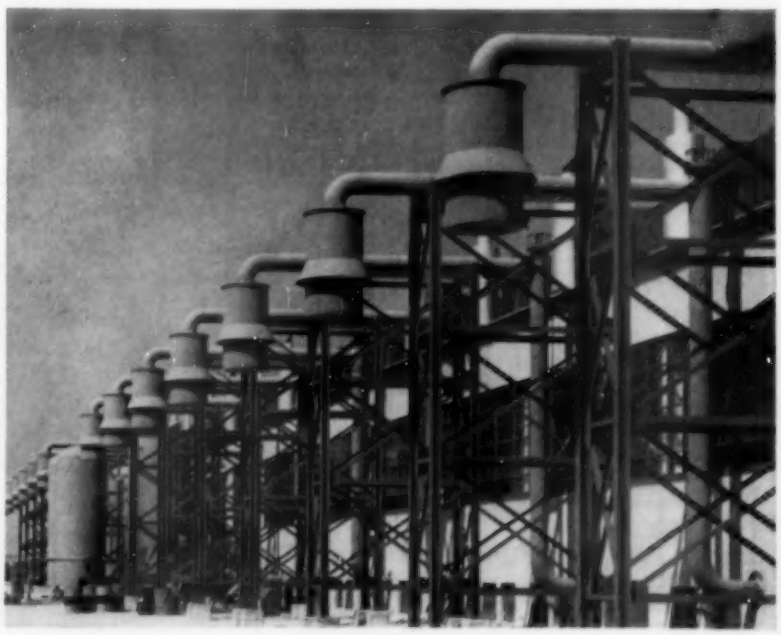
Naturally, too, Texans have developed many new tools, new equipment, new methods, and new processes which have brought progress and efficiency to all branches of the petroleum industry and which are in use in all parts of the world. A list of the Texas manufacturers of oil equipment and service companies, and the numbers of men they employ in production and research would be as big as anything else connected with Texas oil.

And Texas oil never stops progressing. When the Japs cut off our rubber supply in 1941, Texas oil poured into the new synthetic-rubber plants, and the state now produces about half of America's man-made rubber.

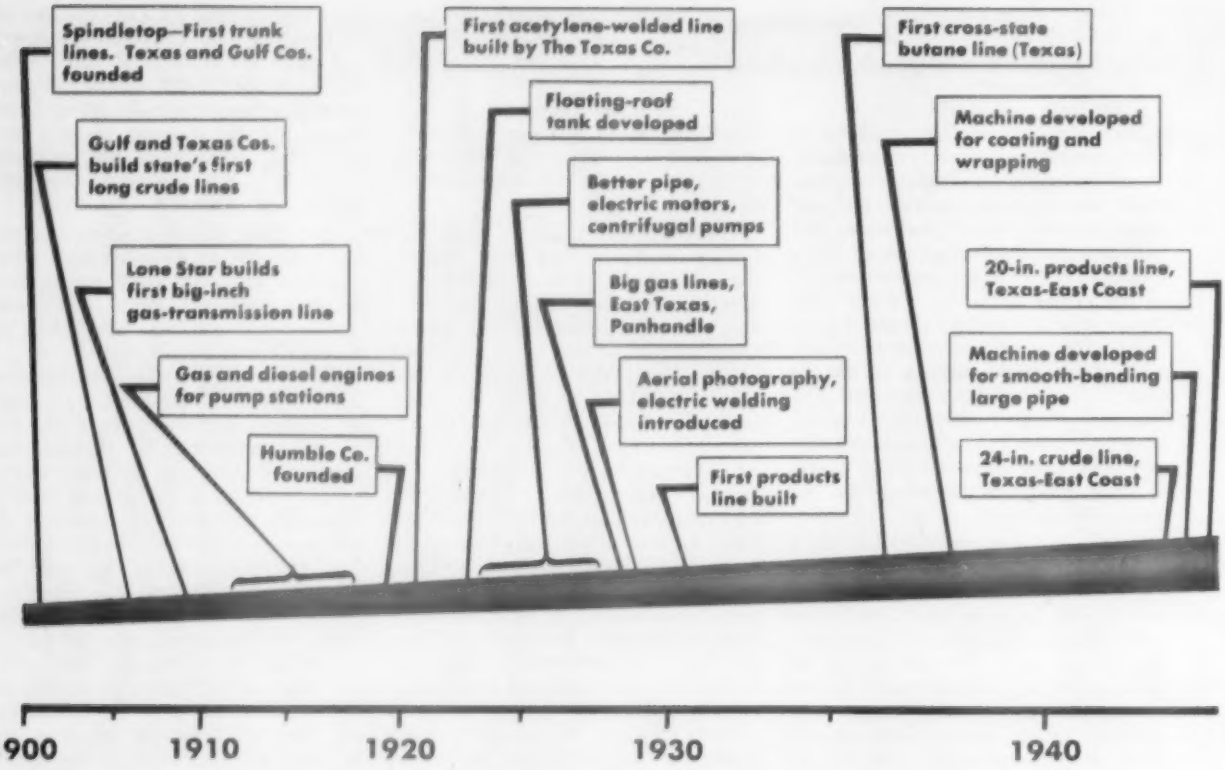
From this it was a natural and easy step into petroleum's newest, most magical domain—petrochemistry. In the last few years more than 50 petrochemical plants have sprung up in Texas, representing millions of dollars and turning Texas oil and gas into thousands of new and useful products. In petrochemicals, too, Texas ranks the first, the most, and the biggest.

For more than half a century now, Texas has been the center of gravity of the world's oil industry, and it will stay that way if Texans have any say in the matter. Ever since Spindletop, the story of Texas oil has been one of boom and expansion, of new methods and ideas, or firsts and superlatives.

"Ever since Spindletop, the story of Texas oil has been one of boom and expansion, of new methods and ideas, of firsts and superlatives."



Petrochemical plants like this one of Dow Chemical Co. are the latest chapter in Texas' oil and gas history.


Spindletop—First trunk lines. Texas and Gulf Cos. founded
Gulf and Texas Cos. build state's first long crude lines
Lone Star builds first big-inch gas-transmission line
Gas and diesel engines for pump stations
Humble Co. founded
First acetylene-welded line built by The Texas Co.
Floating-roof tank developed
Better pipe, electric motors, centrifugal pumps
Big gas lines, East Texas, Panhandle
Aerial photography, electric welding introduced
First products line built
First cross-state butane line (Texas)
Machine developed for coating and wrapping
20-in. products line, Texas-East Coast
Machine developed for smooth-bending large pipe
24-in. crude line, Texas-East Coast
1900
1910
1920
1930
1940

TEXAS PIPELINES . . . Over 82,000 Miles

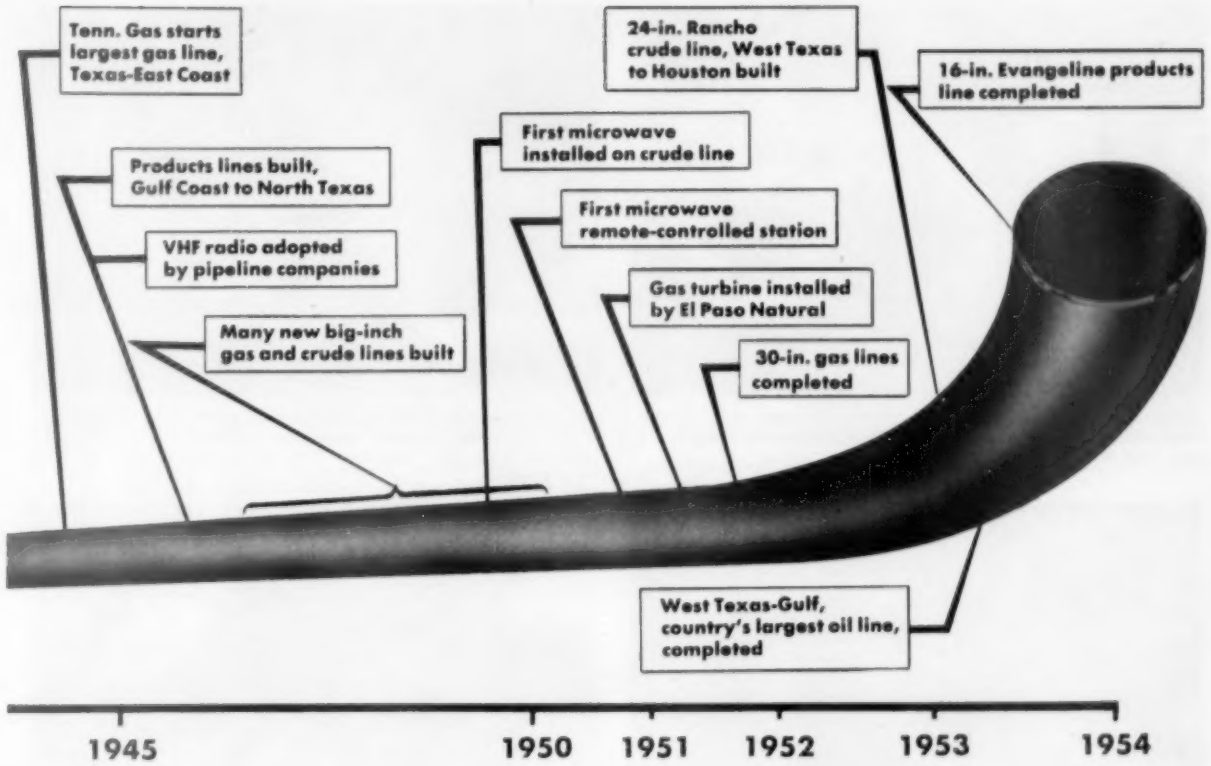
by R. G. Deering
Assistant Pipeline Editor

PIPELINES in Texas today, many of which are owned by companies whose origins are tied in with the great oil discovery at Spindletop, reach into every corner of the state, gathering crude and gas, and delivering products. Radiating from the state are large and small transmission lines, carrying crude to refineries in all parts of the nation. Natural-gas transmission lines, the first of which was started in 1909, stem from fields in all parts of Texas, serving the state's needs and extending to market areas in the west, north, and east. Products lines, a newcomer in the industry, are becoming increasingly important in transporting volatile fluids from Texas refineries to market areas within and without the state.

Prior to 1901, year of the discovery well at Spindletop, the Texas pipeline industry consisted principally of a few short gathering lines supplying a small refinery near Corsicana. Then came Spindletop. With it came a race to lay pipelines — lines to move the great supply of Texas crude to nearby seaports and thence to northern and eastern markets. Within 3 years there was a network of small lines around Beaumont and along the prolific producing area on the Gulf Coast.

From this beginning for Texas there has evolved in the state an industry which today counts its pipe miles in the tens of thousands, its installed sta-

MULE POWER . . . Part of stringing and construction crew for laying 8-in. pipe near Cleveland, Tex., in 1912 . . .

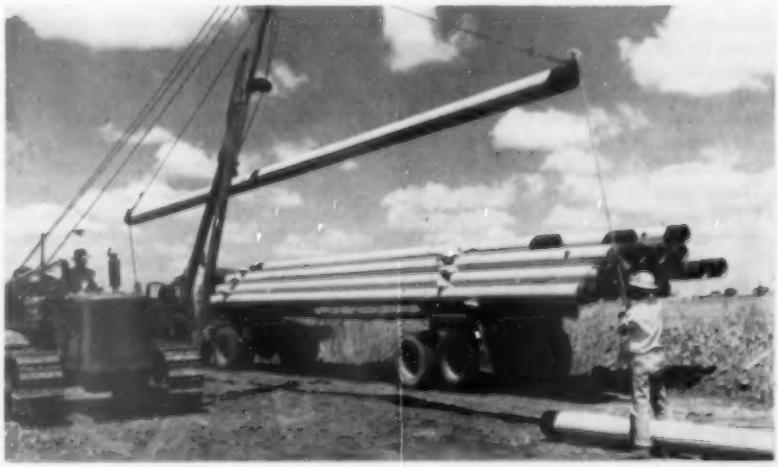

Tenn. Gas starts largest gas line, Texas-East Coast
Products lines built, Gulf Coast to North Texas
VHF radio adopted by pipeline companies
Many new big-inch gas and crude lines built
First microwave installed on crude line
First microwave remote-controlled station
Gas turbine installed by El Paso Natural
30-in. gas lines completed
24-in. Rancho crude line, West Texas to Houston built
16-in. Evangeline products line completed
West Texas-Gulf, country's largest oil line, completed
1945
1950
1951
1952
1953
1954

# of Them—A Story of Achievement

tion horsepower in the millions, and its throughput per day in the millions of barrels and billions of cubic feet.

Big-inch lines extend 500 miles and deliver 300,000 bbl. of crude per day; microwave radio systems stretch across the state; automatic pipeline stations operate by remote control; tank farms have capacities of 5 million barrels. These are a few of the many outstanding features of Texas' modern pipeline industry.

Today, the pipeline mileage in Texas, exclusive of gas-distribution systems, amounts to over 82,000 miles, or about one-fourth the total mileage in this country.



. . . VS. "HORSEPOWER" . . . Stringing operations in 1950 on Pan American Pipe Line Co.'s 10-in. line in West Texas.

Spindletop Era, 1901-1910

Shortly after the Spindletop discovery several pipelines were hastily laid to Port Arthur and Sabine Pass, some 20 miles south of the producing area. Here, small refineries were built and, in addition, deep-water terminals were constructed to facilitate loading of crude on ocean-going vessels.

In 1901, J. M. Guffey Petroleum Co., forerunner of the present Gulf Oil Corp., completed one of the first lines to a refinery site in Port Arthur. In the same year a 6-in. line was laid by Lone Star & Crescent Oil Co. to a terminal at Sabine Pass. Shortly after its completion, this line was absorbed by Sun Pipe Line Co. and remained as an important part of its system for many years.

Another 6-in. line from Spindletop to Port Arthur was completed in 1902 by Texas Fuel Co., (later The Texas Co.) and was the first trunk line of the enormous system now operated by Texas Pipe Line Co.

By 1905 the fields of Sour Lake,

CONSTRUCTION GANG, 1915 . . . Crews like this, working with tongs and sharpshooters, were responsible for all construction in the state until the 1920's.

WELDING OPERATIONS, 1928, on the country's first long-distance, electrically welded pipeline, constructed by The Texas Co. The line extended from San Augustine, Tex., to Corsicana and was built of 8-in. pipe.

WELDING OPERATIONS, EARLY THIRTIES . . . Bell-hole welding used for tying roll-welded sections together was common until early forties when present method of "stovepipe" welding became widespread.

COATING AND WRAPPING MACHINE, 1937 . . . This early model was developed by Crutcher-Rolfs-Cummings. Prior to this development wrapping was usually done by a hand-powered device pushed behind the coating machine.

Saratoga, Batson, and Humble had been discovered. At that time, according to an early issue of The Oil Investor's Journal, (which later became The Oil and Gas Journal), there were 394 miles of trunk pipelines in the Gulf Coast area. Of these, 313 miles of line ". . . are for the purpose of transporting oil for hire." These pipelines, constructed principally by the Gulf and Texas companies, served to deliver crude from the new fields to ports of Port Arthur, Sabine Pass, and Houston. Other lines were to rail-loading points on the Southern Pacific Railroad near Raywood, 30 miles west of Beaumont.

Completed in 1907 were two construction projects which were major ones for pipeliners of that day. These were the lines laid by both the Gulf and Texas companies from the Glenn Pool discovery in Oklahoma through East Texas to connect with their respective systems on the Gulf Coast.

A description of one of the 12 stations used on The Texas Co. line offers an interesting example of design during the period. A typical station had three 175-hp. boilers, two steam pumps, and two 37,500-bbl. steel tanks. This 470-mile, 8-in. line connected to The Texas Co. system at Humble.

The Gulf line, also 8-in., was 413 miles in length and terminated at Sour Lake. Its route of construction became known as "pipeline alley" in later years as the original line was looped many times and several other companies built paralleling lines to move crude from East Texas to the coast.

Lone Star Gas Co. was the builder of the state's first big-inch natural-gas pipeline, completing the line in 1910. Constructed of 16-in. pipe joined with bolted couplings, this line supplied the Fort Worth-Dallas area with gas from the newly discovered Petrolia field, 130 miles to the northwest. It was the backbone of what has since become one of the largest integrated gas utilities in the state.

Rapid growth, few changes . . . In the years from 1911 to 1920 the industry expanded steadily as new fields were discovered on the coast, and in North and West Texas. Growth on a mileage basis was tremendous compared to that immediately after Spindletop but few changes were made in operating techniques or construction practices which would distinguish this decade from the previous one.

For the most part, pipelining was still the old, back-breaking job of laying screw-coupled pipe in hand-dug ditches. True, ditching machines and mechanical rigs for making up screw joints were used in some instances, but these were minor exceptions rather than the rule. The sharpshooter, chain tongs, and bucking board were still the mark of the pipeliner.

Some noteworthy changes were made in station and terminal equipment during this period, however. By the end of World War I the familiar steam pump station had been replaced in many cases by stations having gas or diesel engines. However, the slow-speed, positive-displacement pump was

EARLY MODEL of machine for producing "wrinkle" bends; it was developed by Crutcher-Rolfs-Cummings and was used on wartime Big Inch line. At right is an example of the bends made by this "controlled-buckling" process. Shortly after this, machines were introduced which made smooth, "stretch" bends.

POSTWAR big-inch construction on Magnolia Pipe Line Co.'s 20-in. crude line from Corsicana to Illinois. Note use of glass wrapper instead of felt for protection of coating. At right, two welders are shown making "hot pass" on thick-wall pipe used for river crossing.

still the work horse for moving oil and was not to be challenged until the late twenties when high-speed centrifugal pumps came into the pipeline picture.

Perhaps one of the most important developments of the era was the evolution and adoption for general use of more suitable oil-storage methods. During boom days of Spindletop, Sour Lake, and Batson a few 37,500-bbl. steel tanks, most of them with wood roofs, were in use in Texas. However, it was far more comon to see large, open earthen pits used for terminal storage and wooden vessels for field storage. This, of course, resulted in a tremendous amount of loss due to leakage, seepage, and evaporation.

By the early 'teens the 55,000-bbl. riveted tank, with either wood or steel roof, was rapidly becoming standard throughout the industry, replacing the 37,500-bbl. tank and ending for the most part the use of open storage. About the same time the bolted steel tank was supplanting the wooden tank for field storage.

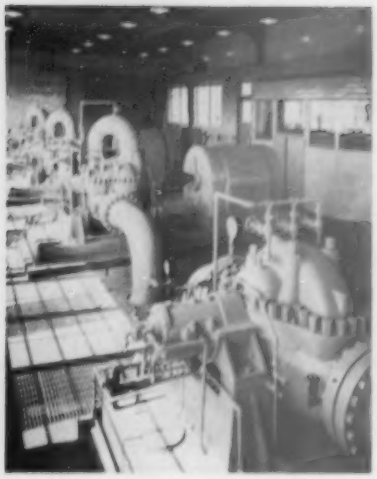
Tank fires of the day, caused largely by lightning, were responsible for development of elaborate systems for tank protection. One advertisement in a 1914 issue of the Journal claims that a particular model tank ". . . is absolutely fireproof because of its automatic, foam sprinkler system."

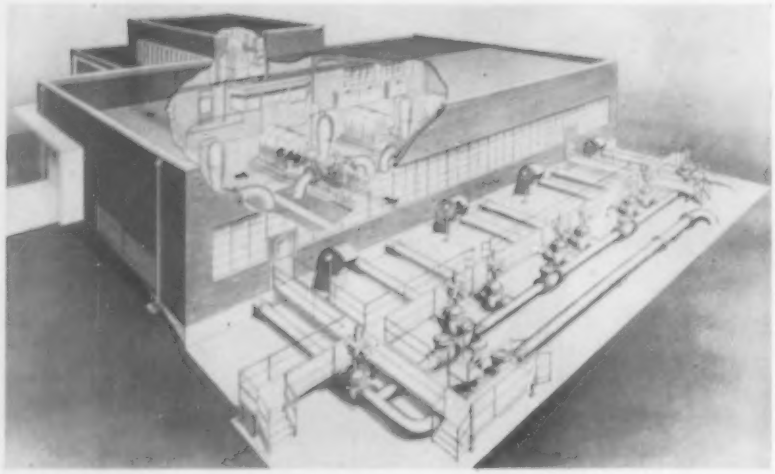
Lightning-arrester systems of various configurations were also used in attempting to prevent ignition of fumes from the leaky roofs.

With the placing of steel roofs on tanks came the need for flame-arresting vents and such devices began to appear about 1913.

New companies . . . Two pipeline companies started operation in Texas during the 'teens which were later to become majors in every respect. Magnolia Petroleum Co., organized in 1911, constructed an 8-in. line in 1912 extending from Beaumont through Corsicana to Electra, in Wichita County. By 1914 this system had been extended to connect with lines in Oklahoma.

The Ranger boom of 1919 was the incentive for the laying of an 8-in. line from Eastland County to the Houston area by Humble Pipe Line Co. The activities of this company expanded rapidly and soon trunk lines were laid to the important fields of Texas. A 130-mile extension connected Eastland County with Big Lake field in West Texas and a 110-mile line was constructed from Duval and Jim





ULTRAMODERN PUMPING STATION of Rancho Pipe Line System. Left view shows three 1,750-hp. electric-centrifugal units and a 900-hp. "half" unit. Drawing at right shows how ventilating air passes through the plenum chamber, into the electric motors, and out into the manifold area. Valves in manifold are motor driven and may be operated from control room.

Hogg counties to a refinery at Ingleside, near Corpus Christi.

The year 1919 also marked the installation of the first pipeline compressor station in the state as Lone Star found it necessary to boost pressure on its gas line from Petrola to Fort Worth.

Legal developments during the decade include the classing of pipelines in Texas as common carriers and placing them under the jurisdiction of the state Railroad Commission. This law was passed in 1917 and followed a U. S. Supreme Court ruling of 1914 which had held interstate pipelines to be common carriers.

Major Changes From 1920-35

Methods of pipelining began to change rapidly shortly after World War I. Important technological advances in construction practices, operation, and equipment were made during the twenties.

Perhaps the first major advance seen in Texas was the construction in 1920 of an acetylene-welded pipeline by Prairie Pipe Line Co. This 8-in., 140-mile line ran from Jacksboro to Mexia, Tex., and was the first long-distance oil line in the country to be constructed by welding. Despite the fact that pipe joints were only 17 to 24 ft. in length, the line was completed in record time. An interesting point concerning its construction is that officials of the company feared that welding would not hold up, and if it did, would cause icicles inside the pipe and seriously interfere with scraper passage. Upon completion, however, the line withstood an 800-psi. pressure test and passed a scraper faster than comparable-length screw lines.

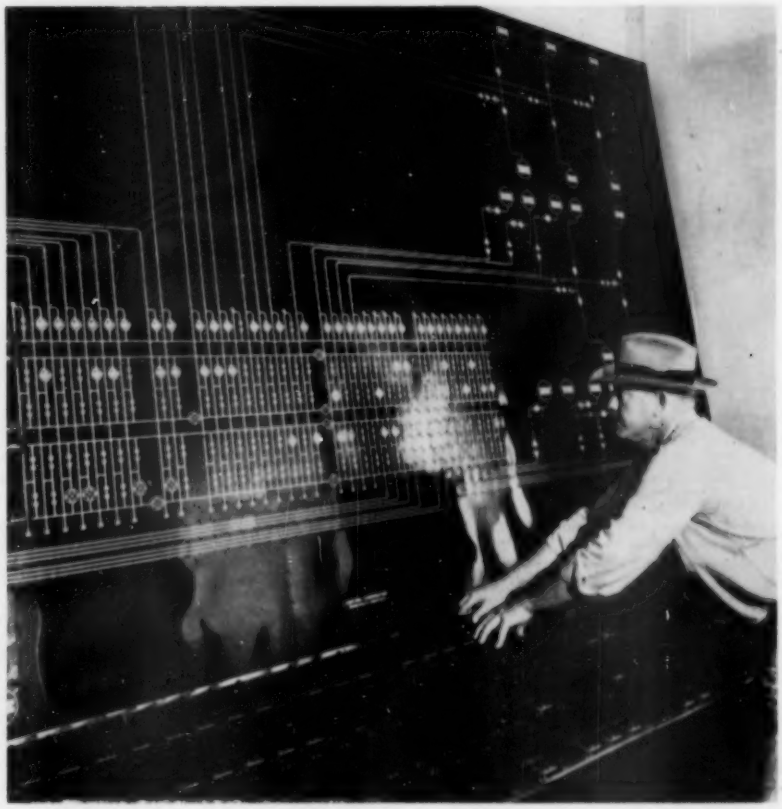
Magnolia was quick to adopt the welding process and completed an 8-in. line in 1923 extending from Luling, Texas, to Beaumont. Other companies followed suit and within a few years the oxyacetylene process was accepted as the proper method of joining pipe.

Electric welding, though it had been used earlier for making line repairs, was not used in new-line construction until 1928. In that year Texas Pipe Line laid 169 miles of 8-in. from San Augustine to Corsicana and used electric welding on much of the line. The welded portion was constructed with bell and spigot-ended pipe.

The new welding method proved sound and economical and by the mid thirties the electric arc was rapidly replacing the acetylene torch for pipeline welding. Bell and spigot-ended pipe which was used in early projects, soon gave way to internal backup rings which reinforced the weld area and

MODERN METHODS are exemplified by these pictures of recent construction on the 24-in. Rancho Pipe Line System. At left are double-coating and wrapping operations followed closely by electrical inspection. The "lizard," at right, was used to protect coating during back-filling work. Rubber covered, it was placed over pipe while dozer made first pass, then pulled from under fill and onto another section of pipe.

MICROWAVE TOWERS are becoming common along right-of-ways throughout Texas. This is Humble Pipe Line Co.'s communication tower at Kemper station.



CONTROL PANEL, located at Texas Pipe Line's East Houston station, is indicative of the swing toward remote-control operation. From this panel the operator can control all pumps and valves at the terminal. Position indicators for each controlled component show whether valve is open, closed, or in a transitive position.

prevented formation of weld icicles. This internal sleeve offered an obstruction at each joint, however, and its use was discontinued by the late thirties as straight butt welding was adopted.

Better pipe . . . One of the most important developments of the period was the introduction in 1927 of new types of pipe having much higher tensile strength. Seamless line pipe, first to appear, made its debut in Texas in 1928 when Pasotex Pipe Line Co. constructed 195 miles of 8-in. line from Wink to El Paso.

Electricially welded, seamed pipe was marketed shortly afterwards and soon became a competitor for the seamless variety. Both types were adopted for trunk-line service by companies in the state.

Important advantages were offered by the new-type pipe. Its thinner walls and greater strength meant significant savings to pipeline companies in the forms of reduced freight charges, lower construction costs, higher pressures, and greater throughputs.

Storage methods were again subject to much investigation during the twenties and one innovation is particularly noteworthy. This was the introduction in 1923 of the floating-roof tank, invented by John H. Wiggins. The vapor-saving and fire-prevention principles of the tank were readily accepted by pipeline engineers and many were installed in Texas by 1930.

By the late twenties the maximum size of terminal tanks had been increased to 80,000 bbl. and tanks of this capacity were built in most new terminal projects. Concrete-lined pits, some with capacities of 500,000 bbl., were also used in this period but gradually gave way to steel storage.

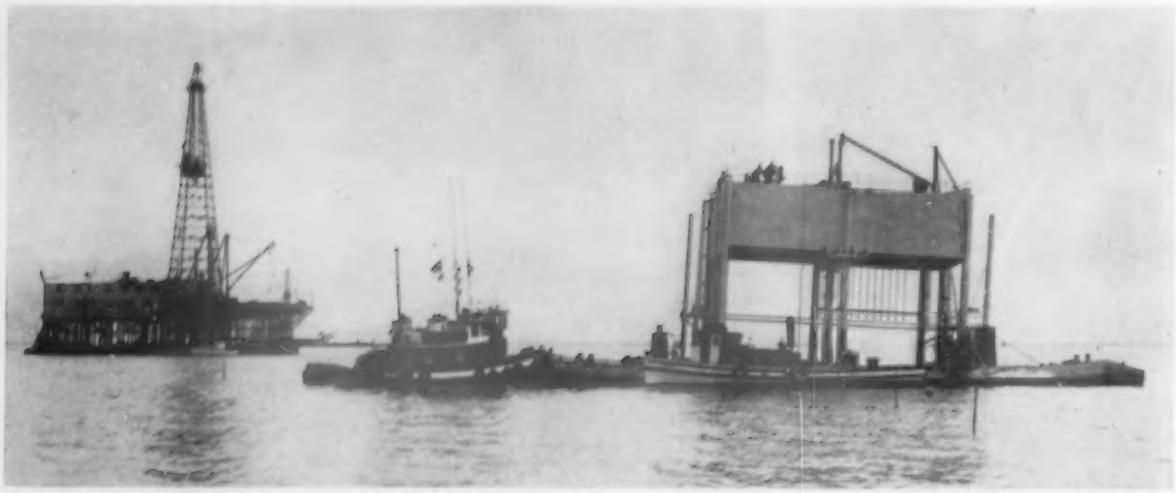
Corrosion investigations . . . By 1920 pipeline officials and engineers were becoming increasingly aware of corrosion losses. Most companies initiated studies of the problem and National Bureau of Standards, with the cooperation of the industry, started an intensive investigation of the subject.

Results of these investigations pointed to the need of an impervious coating, one which could ". . . completely exclude all moisture and other corresive agents from the metal." By 1930, as a result of these studies, most new construction included the use of some form of coating for pipe protection. Various types of coating, including asphalts, coal-tar enamel, and grease were used in an attempt to find a product which would completely protect pipelines.

Although a few pipe-coating mills were in operation in the twenties, coating was done almost exclusively by hand in the field, using granny rag and pouring bucket. By the early thirties, however, yard coating plants and line-traveling coating machines were in use for most major construction projects.

The galvanic nature of corrosion was generally understood; engineers agreed that electric currents were responsible for damages to pipelines and the use of insulating joints to eliminate line currents was advocated as early as 1926. Regardless of this, it was not until the early thirties that protection by impressed currents was accepted as being anything but a curiosity. By 1934, however, several cathodic-protection installations were in operation on lines of The Texas Co., Shell Pipe Line Corp., and United Gas Public Service Co. Engineers of other companies were

(Continued on page 238)



INSHORE ACTIVITY in Texas has held the spotlight for several years, though at one time the Corpus Christi-Redfish Bay-Mustang Island operation was the only offshore activity due to the tidelands controversy. At left is Kerr-McGee Oil Industries, Inc.'s, shallow-water-barge rig at work in Redfish Bay. At right, being towed to location, is a new-type submersible production barge of Sunray Oil Corp.

Texas Eyes Offshore Prize

• Operators getting set to give the tidelands a workout
• The stakes are high: an estimated 10.5 billion barrels

by William P. Sterne
Gulf Coast District Editor

OFFSHORE-DRILLING EQUIPMENT is expensive, and every means is being taken to design it economically. Such studies include the use of detailed scale models. Here is a permanent-type offshore drilling platform fitted with standard derrick about to be serviced by a special tender ship. Note the walkway at the bow of the ship, the "Humble 5-T."

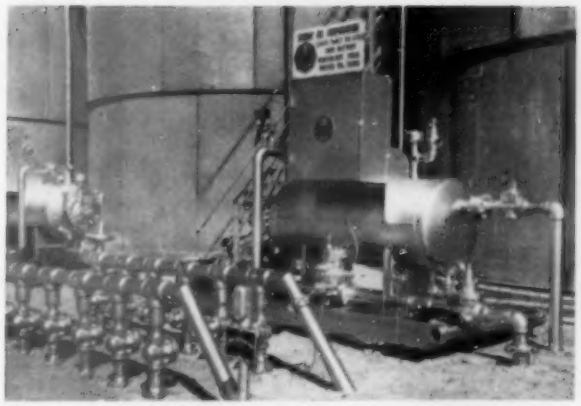
A NUMBER of Texas operators are preparing to cast their bread upon the waters of the Gulf of Mexico.

It will be in the form of one of the most extensive drilling and development programs ever undertaken on submerged lands of the Continental Shelf—or anywhere else.

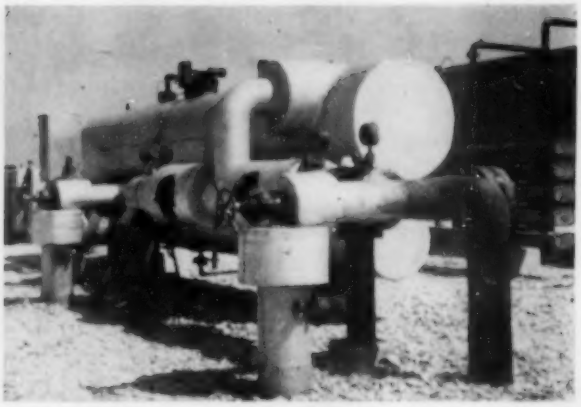
The stakes are high: Geologists estimate that there is, conservatively, at least 10.5 billion barrels of oil under that narrow strip of submerged land lying along Texas' coast, over which the state has jurisdiction. And this does not include the lands on the outer Continental Shelf, from the 3-league (10½-mile) boundary, over which the federal Government has control.

To date, however, there has been little proof that this oil is there. No one has yet made a commercial discovery in the Texas tidelands. This may come as a surprise to some who think oil is running out all over the place, probably because they have become accustomed to the bureaucratic slogan, "oil-rich tidelands."

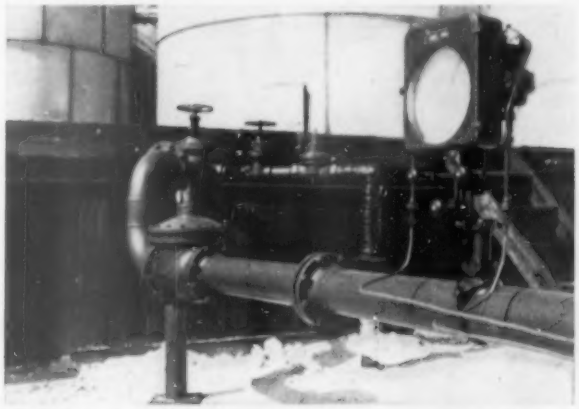
New ventures set . . . But it will be only a matter of time. The Texas tide-



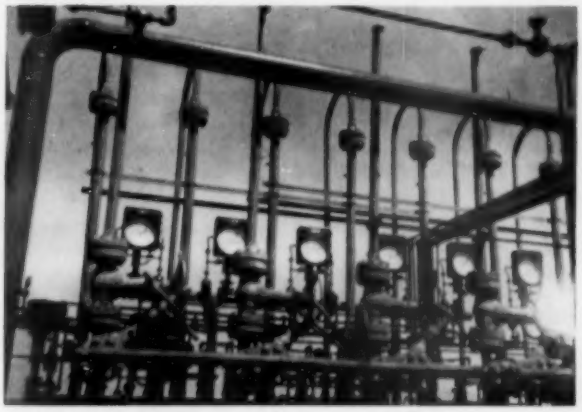
INSHORE PRODUCTION off Texas is prolific. This Sunray tank-battery installation on Dagger Island provides lease separation and storage for oil wells in the surrounding area.



LOW-TEMPERATURE EXTRACTION (LXT) unit operated by Renwar Oil Corp. separates distillate from high-pressure gas flow from gas distillate wells in Redfish Bay-Mustang Island fields.



METER INSTALLATION of Sunray Oil Corp. on Dagger Island measures casing-head gas from Sunray wells in the field to a compressor plant located on shore near Aransas Pass.



WELL-HEAD METER manifolds measure high-pressure gas from gas-distillate wells in Redfish Bay to separator platform for Sunray Oil Corp., et al.

lands are to see a concentrated drilling program which should prove—or disprove—the geologists' theories.

As a matter of fact, within the past couple of months two groups have been formed by different companies to work in the Texas tidelands. In addition, a couple of firms have been organized which plan to work exclusively in the tidelands on a contract-drilling basis. Other companies and other contract firms are expected to be formed soon to enter the play.

"Inshore" work . . . It must be pointed out here that most offshore activity in Texas during the past few years has been done in the shallow "inshore" areas—bays and inlets which are typical of the Gulf Coast region. Drilling operations out on the Continental Shelf off Texas' coast were just getting a good start when the Government stepped in and called a halt.

Results of these inshore-area activities have been highly successful. This success, notably in such tidal areas as Corpus Christi Bay, Copano Bay, Matagorda Bay, Galveston Bay, and Laguna Madre, has led operators and geologists alike to believe firmly that much bigger possibilities await the drill out in the deeper waters over the shelf.

It appears, then, that nearly everybody wants in on the act of going out into these deep waters. Strengthening this assumption was the record-breaking lease sale held by the State of Texas last December, although operators know that they are getting into an expensive proposition when they talk real offshore operations.

Record bids . . . During this sale in Austin, extremely high bids were offered for a number of offshore blocks. Gulf Oil Corp., for example, paid $3,065,880 for a single 5,760-acre tract, lying 5 to 8½ miles off Mustang Island. Several other companies, namely, Atlantic Refining Co., Cities Service Oil Co., Tide Water Associated Oil Co., and Continental Oil Co., offered a joint bid of $1,008,000 for this same tract.

The big lease sale, first to be held which incorporated lands on the Continental Shelf since the tidelands-ownership controversy was settled by passage of the Submerged Lands Act by Congress, took in an average of $78.50 per acre for the tidelands blocks. A total of nine bids exceeded the million-dollar figure for various tracts, and Magnolia Petroleum Co. paid in excess of a million dollars each for three tracts. Pure Oil Co., veteran offshore operator, offered nearly as much for one of them but lost out to Magnolia.

Activity increasing . . . In the little more than a year since the President signed the controversial tidelands bill, there has been a great increase in activity.

Several operators have tended to hold back until a final decision was made by the Supreme Court on the constitutionality of the Submerged Lands Act, but indications are, now that this formidable stumbling block seems permanently removed by the court's recent decision, many new operators will enter the offshore areas.

TYPICAL WELL-HEAD INSTALLATION on Sunray's producers at Mustang Island and Redfish Bay fields, South Texas. The well is protected by a steel caisson which will deflect any blow by small craft. Platform holds a marker light, and serves as a base for routine servicing.

Plans stepped up . . . Everywhere along the Texas Gulf Coast interest in offshore drilling and producing possibilities is running at a high pitch. Various operators who have held onto their offshore leases since 1947 are taking a "new look" at their holdings.

Some operators are pushing plans, revising their budgets to include big offshore appropriations. Others are busy designing novel equipment to meet their particular needs in the areas in which they expect to operate.

Still other operators have already placed bona fide orders with shipbuilding companies for conventional drilling platforms, new-type tender ships, revolutionary drilling barges, and related equipment.

This renewed interest received added emphasis at the American Petroleum Institute's division of production meeting in Houston in March. A special symposium on offshore drilling and production practices was held to review new equipment and techniques, not only for drilling but for production also.

Early activity . . . Immediately after World War II, a number of major companies began drilling and exploration activities offshore. This initial effort, however, was primarily off the coast of Louisiana, and the leaders were Kerr-McGee Oil Industries, Inc., of Oklahoma City, which has the distinction of bringing in the first offshore oil production in the Gulf of Mexico off Louisiana; The California Co., which discovered two major fields off Louisiana; Shell Oil Co., which made a strike at Main Pass off Louisiana; Humble Oil & Refining Co., which made efforts to bring in commercial production off Texas' coast; and Pure Oil Co., which found substantial gas off Louisiana.

Humble erected a huge and costly permanent-type drilling platform off the Texas coast and drilled a number of wells but failed to find oil or gas of commercial quantity.

In those "early" days of tidelands activity, operations over deep water was done primarily from the permanent-type platform, which was usually fabricated as a unit on land, towed to sea, and installed on expensive piling driven into the ocean floor. The expense of such installations made these undertakings almost prohibitive for the independent operator, although it now appears the platform technique, through modification to eliminate much of the costly piling, may be favored for Texas tidelands work.

SEISMOGRAPH WORK off the Texas coast has picked up considerably since the Submerged Lands Act was passed by Congress. Here a Shell seismograph crew sets off a shot in shallow waters.

Only the larger companies could afford to take such risks of sinking millions of dollars into a platform-rig setup before any production was actually proven. Too, these early-day platforms had little salvage value, thus adding to their over-all cost.

When the tidelands-ownership question was raised by the Interior Department, the major companies began hauling in their oars. Most retired from the tidelands with a wait-and-see attitude. A directive by the department that no new drilling wells could be started until the final decision was made on the ownership question contributed to the period of inactivity from the years 1950-53.

New ideas . . . But those companies which had done work in the tidelands knew what they were up against. They knew that some way must be found in which deep-water drilling operations could be carried on more economically than in the past. Not only that, but they knew that if production were found they would have to find the economical means of getting it to market.

Thus, many techniques have been brought forth since the original tidelands operations, although they haven't been tried and proved as yet. These ideas lean heavily toward the portable, submersible-type barge, which can drill in deep water, then move off quickly and onto another location, without the necessity for erecting permanent structures.

It must be pointed out here, however, that to date practically all offshore-drilling operations planned later this year in the Texas tidelands are scheduled to be done from permanent-type platforms. Although expensive, they are necessary at this early point in the game because the newer-type submersible barges are not yet obtainable. A number of modifications in fabrication promise to cut substantially the cost of these platforms.

New Equipment

Following are some of the radical new designs which are either being built or will be constructed in the immediate future, to do away with the permanent-type platform:

. . . 1. A submersible barge which can drill in water up to 22 ft. deep is now

(Continued on page 253)

62.7 MILES OF HOLE in 1 year. This Shell rig drilled 331,316 ft. of hole in 98 wells during the past year in Big Foot field, Frio County, Texas.

DRILLING CAVERNOUS FORMATIONS. This well and others in the Edwards Plateau of West Texas have used air for drilling through cavernous sections.

Texas Drilling—A Study in Contrasts

Fast hole to hard rock—deep production to grass-root oil

by Ed McGhee
Drilling-Production Editor

IN its various areas, Texas presents almost every known drilling situation. There is hard-rock drilling; there is fast, easy hole cutting. There are high-pressure gas zones; there are low-pressure, easily contaminated pays. There is deep production; there is shallow, grass-root oil.

There are heaving shales, lost circulation, cavernous limes, crooked-hole formations, etc., etc.

Name it; Texas has it—somewhere.

Gulf Coast and Southwest

On the Gulf Coast and in Southwest Texas, most holes are cut fast, and pay zones are found from the grass roots on down. As a result, footage prices of drilling contracts are relatively low compared to other areas.

However, drilling here is not without its problems. Biggest headache is with lost circulation. It is necessary that mud weight be maintained at high values because of the frequently encountered high-pressure gas zones and because of the possibility of abnormal pressures. These high mud weights, of course, can induce loss of circulation.

In some wells, a weight balance of as little as ½ lb. per gallon must be maintained to prevent the hole from "sucking" on the one hand or "blowing" on the other.

Drillers must also exercise care to avoid pulling the drill pipe rapidly enough to pull formation gas into the mud stream. One operator recently drilled a well in which mud was being pumped into the standpipe at 14 lb. per gallon and consistently came out in the ditch at 9 lb. per gallon. It was necessary in this case to use a mud-degassing system to maintain a proper mud weight.

As elsewhere, contractors drill most Texas Gulf Coast wells, but many companies see fit to maintain their own rigs in the area. This is probably because of the risk involved with high pressures and because of day-rate provisions in most contracts regarding lost circulation.

New development . . . From the Texas Gulf Coast has come the most revolutionary development of recent years in well work—the permanent-type completion. The first and most apparent effect on drilling of this wire-line completion and workover method is that it allows the rig to be released after oil string is set.

Although it is not accepted in all areas, the permanent-type completion is proving an economic success in the conditions peculiar to the Gulf Coast. These are the factors that make wire-line completions and workover applicable there:

1. There are numerous, thin oil and gas sands. The permanent-type completion makes testing cheap enough to permit a thorough evaluation of several zones in any one well.

2. Producing depths are often great. Workover with wire lines is relatively the same in cost regardless of well depth, while cost with conventional units varies directly with workover depth.

3. Gulf Coast locations are sometimes extremely difficult for heavy equipment. Wire-line equipment is easily transported, and is very cheap compared to regulation barges in the case of over-water locations.

Texas Drilling Contractors . . .

HOW MANY ARE THERE? . . . In the State of Texas on April 1, 1954, there were approximately 1,250 rigs—rotary and cable tool—actually running. The Journal's census shows that there are headquartered in Texas, 552 rotary drilling contractors alone. These contractors own 1,760 rigs of which 1,449 were turning at the time of the Journal's census.

Of course, not all of the hole dug in Texas is made by contractors with home offices in Texas. However, only 53 United States contractors have more than 10 rotary rigs; and 24 of these are Texas based. These 24 Texas contractors, while representing only 2 per cent of the country's total, own about 8.8 per cent of the country's rigs.

WHERE ARE THEIR HEADQUARTERS? . . . Houston leads as the home town of the most Texas rotary drilling contractors owning the most rigs; the Dallas-Fort Worth area is close behind.

WHERE ARE THEY DRILLING? . . . The biggest concentration of drilling rigs is in West Texas. As of April 1, 1954, here is where the rigs were:

Area—	Rigs
West Texas (7-C & 8)	437
North and West Central (7-B & 9)	360
Gulf Coast (2 & 3)	191
Southwest (1 & 4)	185
East Texas (5 & 6)	84
Panhandle (10)	53
Total Texas	1,250
Total United States	4,736

Texas Well Completions, 1953

	Total comp.	Oil	Gas	Service	Dry	Average footage
North Central (9)	3,675	2,060	28	33	1,554	3,328
West Central (7-B)	2,790	1,500	23	1	1,266	3,486
West (7-C & 8)	3,735	2,664	30	15	1,026	5,440
Panhandle (10)	770	418	268	0	93	3,355
East (5 & 6)	808	300	99	1	402	5,212
Gulf Coast (2)	877	323	140	0	414	6,073
Gulf Coast (3)	1,643	810	151	2	680	6,716
Southwest (1)	917	428	15	0	474	3,150
Southwest (4)	1,788	877	224	3	684	5,792
Total Texas	17,983	9,380	978	55	6,593	4,626
Total U. S.	49,279	25,762	3,806	1,262	18,449	4,035

How many wells are completed?

Texas Drilling Depth Classification, 1953

How deep do they drill?

	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	12,500-15,000 ft.	Over 15,000 ft.
North Central (9)	1,525	1,375	735	36	3	1	0
West Central (7-B)	971	1,222	597	0	0	0	0
West (7-C & 8)	426	1,348	1,230	445	183	98	5
Panhandle (10)	83	651	22	11	3	0	0
East (5 & 6)	90	281	339	91	5	2	0
Gulf Coast (2 & 3)	210	525	795	815	153	16	6
Southwest (1 & 4)	592	841	832	386	46	7	1
Total Texas	3,897	6,243	4,550	1,784	393	124	12
Total U. S.	15,221	20,045	8,686	3,508	1,379	408	32

Texas Producing Depth Records

Area—	Well and location; county	Result	Year comp.	Producing formation	Prod. depth
Texas, East	Humble 1 Curtis, Larrissa field, Cherokee	Oil	1942	Pettit	10,312
Texas Gulf Coast	Stanolind 1 Sanborn, S. Williams Sur. 106; Matagorda	Cond.	1954	Frio	13,068
Texas, North	Frank Weiner 1 Hazlip, Mineral Creek; Grayson	Cond.	1952	Mulder	10,160
Texas, West	Phillips 1-E Puckett, Glenna pool; Pecos	Gas	1953	Ellenburger	15,000
Texas Panhandle	Sinclair 10-J Lips, 2-1-BBB&C; Roberts	Gas	1952	Atoka	9,066
Texas, Southwest	Western Natural Gas 14 St. Charles Ranch, Blackjack field; Aransas	Gas	1951	Frio	11,490

Texas Drilling Depth Records

Area—	Well and location; county	Result	Year comp.	Producing formation	Prod. depth
Texas, Southwest	Superior 27 Minnie S. Welder, Portilla field; San Patricio	Oil	1951		17,966
Texas, West	Gulf Oil Corp. 1 Northrup, 33-50-T8-T&P; Reeves	Dry	1953	Permian	16,696
Texas Gulf Coast	Phillips 3 Schoeps, Millican salt dome; Brazos	Dry	1945	Cretaceous	16,655
Texas, East	Humble 1 McWatters; Freestone	Oil	1949	Smackover	16,347
Texas, North	Humble 1 Williams, Q. Ygleslas Sur., A-1393; Grayson	Dry	1953		14,363
Texas Panhandle	Guff 1-E Porter "A," 413-43-H&TC; Lipscomb	Dry	1949	Ellenburger	14,278

Another effect of the permanent-type completion on the drilling industry is less apparent in that it may work to make slim-hole drilling more popular. In this area there is no reason why large-diameter hole must be drilled as might be the case if there were problems of hole deviation calling for large-diameter drill collars. There is seldom any necessity for large-diameter casing strings for reason of large production volumes, dual completions, etc.

The wire-line method has performed virtually every operation required in workover jobs, so that diameter of hole is no longer dependent on size of workover tools. Since casing is usually one of the large expenses in drilling and completing a well, slim holes with smaller, cheaper, tubular goods are naturally attractive to the operators. As the permanent-type completion comes into more general use, contractors may expect to be drilling smaller-diameter holes, on the Gulf Coast at least.

Southwest Texas record . . . Drilling in Southwest Texas is much the same as Gulf Coast drilling, with the exception that locations are generally more easily accessible. An example of the speed of drilling—especially shallow drilling—in this area is that of a major operator in Big Foot field of Frio County. Last year one of this company's rigs drilled 98 oil wells for a total of 331,316 ft. of hole. The average well required less than 4 days for 3,300 ft.

West Texas

With plenty of likely sites left for new discoveries, with fast-drilling records being established almost daily, and with some contractors even bidding holes at actual cost, the operating companies in West Texas are getting a lot for their drilling dollars.

While there is currently no spectacular boom, the Journal's survey shows that the total number of wells slated for drilling this year in the area will be little changed from last year. Moreover, the Texas Railroad Commission reports that the first quarter of 1954 has already brought 70 new discoveries to its districts 7-C and 8 (West Texas). And there's no letup in sight.

Holes of 11,000 to 12,000 ft. that would have required up to 12 months if dug 2 or 3 years ago, are now being completed in 60 to 70 days. These phenomenal penetration rates are being brought about by three main factors: (1) contractors' use of bigger drill collars and higher weight on bit, (2) an increased willingness of operators to drill with water, (3) chert bits and jet bits with high hydraulic horsepower.

Although a few rigs from the area have been moved to the Rocky Mountains and a number of others have been stacked, there is presently an excess of rigs in West Texas. The Scurry County and Spraberry booms attracted rigs from other areas and brought about the formation of several new contract-drilling firms. Since those booms have subsided, contractors are feeling the pinch.

As might be expected, competition in contract bidding is keen, and the operators are receiving the benefits. Footage and day-work rates are generally lower than a year ago, and many contracts now contain provisions that return to the operator a part of any savings from extra-fast drilling.

Not for the little fellow . . . The trend in the entire industry is, of course, toward deeper drilling; but in West Texas that trend means very rapidly increasing costs. For that reason, the larger operators will be called on to do most of the exploratory drilling.

Some of the problems that complicate West Texas drilling and make it expensive are these: (1) extremely short drill-pipe life, (2) hard and crooked-hole formations, and (3) frequent lost-circulation zones. These factors make the footage prices considerably higher here than in holes of the same depth in the Gulf Coast or in South Texas.

While current practice is to set casing through the thick salt section, subsequent drilling is still under the influence of contaminated mud. Extreme corrosion fatigue is the result, attacking threaded portions of tool joints and drill-collar connections especially.

Unfortunate experience with lost drill collars and parted pipe has brought adoption of several inspection techniques; and most contractors use one or more of the methods on a regular basis. Various types of protective coatings and cathodic protection have also been tried, but no general solution has yet been accepted.

The industry committees in the area have attempted to arrive at a suitable yardstick for evaluating the performance of drill pipe, as the usual idea of gaging a string's life by feet of hole drilled does not consistently prove out. Nor does a time basis, such as total days of rotation, seem suitable. One suggestion is to rate the drill string's service life in terms of day-feet of operation.

Fast drilling . . . Oversize drill collars and high bit weights take much credit for the improved penetration rates in West Texas. Many still contend that any gains from the use of the big collars do not make up for the impossibility to washover them during fishing operations. Therefore, the use of smaller collars with some form of stabilizer is still popular, and a lot of hole is made with reduced bit weight to keep deviation to a minimum.

Almost all contractors, however, employ enough drill collars to keep the drill pipe in tension.

Frequent lost circulation . . . No currently active field in West Texas has so spectacular a lost-circulation problem as existed in Dollarhide field of Andrews County. There, formations were encountered which are so cavernous that, on occasion, drill stem was observed to drop several feet. Plugging such zones was usually out of the question.

However, loss of circulation is still an acute problem, and the operators are trying many different methods of remedying it. One company is experimenting with the injection of air into the mud stream. Air will, of course, decrease the density of the mud column, thereby reducing loss tendencies.

It is reported, however, that air in the mud has introduced other serious problems, including an apparent acceleration of corrosion fatigue failure of the pipe. This and mechanical problems associated with handling the air-mud mixture still prevent the wholesale adoption of this system.

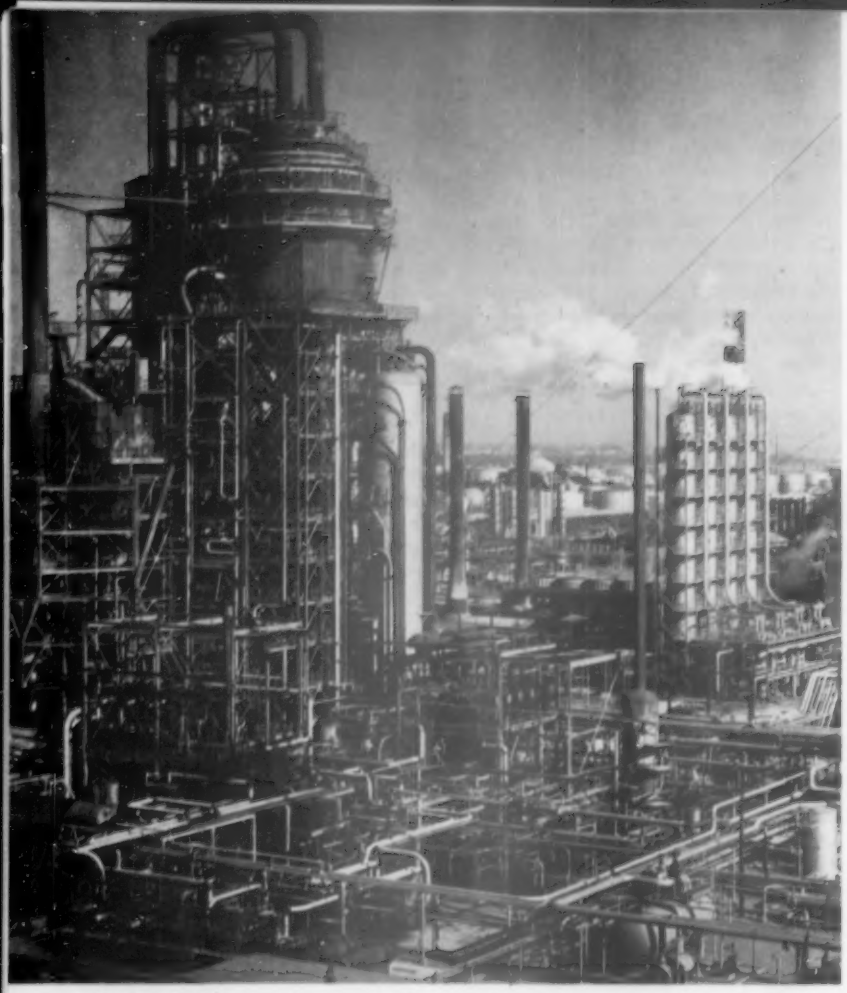
In most areas, operators report successes with the conventional lost-circulation materials. Ground walnut shells and diesel-oil-cement (D.O.C.) treatment are increasing in popularity.

Jet bits, pro and con . . . There is mixed feeling in West Texas about the use of jet bits. Some contractors feel that they get no additional hole nor speed to defray the added cost of jet bits. Some operators agree with the contractors who say that most rigs do not have sufficient slush-pump power to obtain jet velocities in the mud stream. For that reason, jet bits could not be expected to function to best advantage. Other contractors express the opinion that even without jet velocities, jet bits will give enough added penetration and speed to warrant their use.

Everyone does, however, seem to agree on the chert bit. While they do not find it applicable to all formations and all situations, its additional cost is more than saved by reduced round trips from those formations which do respond.

Contractors are watching very closely the success that is had with the chert bit in some West Texas lime formations. Although the limes which do drill

(Continued on page 248)



A MAZE OF PIPES run into this giant fluid catalyst cracking unit No. 2 at Humble's Baytown refinery. The smaller unit on the right is a naphtha fractionating setup.

TEXAS REFINING, PETROCHEMICALS

Crude Charge Capacity . . .

27.6 per cent of nation's total

Polyethylene . . .

Hottest product in petrochem picture

by F. Lawrence Reson
Gulf Coast District Editor

A VERY high level of activity has been maintained by the refining and petrochemical industries located in Texas. Crude-charging capacity increased at a rate greater than for the nation as a whole. Average portion of total catalytic reforming capacity is in operation or under construction in Texas. New construction of petrochemical facilities, particularly polyethylene plants, is concentrated along the Gulf Coast.

Texas continued to set the pace in the refining industry during the past year with expansion programs which increased its crude-oil charge capacity to 2,323,472 bbl. daily, 27.6 per cent of the nation's total.

Gains have been registered in all departments but one, on a comparative basis with the domestic industry. The total percentage charge was up 0.4 per cent from 27.2 the previous year. While the nation's capacity increased 4 per cent, Texas' increased 5.3 per cent. Of approximately 338,000-bbl. daily expansion, 123,000 bbl. or 39 per cent was located in the state. Only in number of plants did the state fail to register a comparative percentage gain, for as the nation increased its number of plants from 320 to 329, Texas increased by 1 from 62 to 63. Table 1 lists growth in refinery capacity over the past 9 years.

Equally impressive comparisons were available in the catalytic reforming field, since some 126,000 bbl. of daily capacity was contracted or under construction in the state, this being approximately 25 per cent of the nation's total projected capacity. In this rapidly growing phase of the industry, Texas had 39 per cent of the country's capacity with 97,000 bbl. in operation, compared to 249,000 bbl. nation wide.

Petrochemicals . . . The eyes of the Texas petrochemical industry, meanwhile, were focused on a number of newcomers to the industry as well as the expanding polyethylene producers. In the former instance four companies have either been organized or have entered the state for the first time in the petrochemical field; while eight companies with nine plants in various stages of construction are in the polyethylene field in the state.

Polyethylene producers will include Dow Chemical Co., Freeport; Carbide & Carbon Chemicals Co., Texas City and Seadrift; Du Pont Co. and Spencer Chemical Co., Orange; Texas Eastman Co., Longview; Monsanto Chemical Co., Texas City, and Koppers Co., Port Arthur. Phillips Chemical Co. has also entered the picture with plans for a semicommercial polyethylene plant at Houston using a new low-pressure process.

Refining

The refinery expansion picture in Texas was highlighted with the placing onstream of the completely new Suntide Refining Co. plant at Corpus Christi. The 30,000-bbl. per day refinery has been built from the ground up and includes a vacuum unit, fluid cat cracker, alkylation plant, and tetramer unit. Meanwhile, another completely new plant has been announced by Gilmore Refineries, Inc. This firm proposes con-

HERE'S HOW Carbide & Carbon Chemicals' plant at Texas City, Tex., looks from the air. Important industrial chemicals produced here include ethylene oxide and polyethylene.

struction of a 50,000-bbl. per day plant to be located at Odessa.

At other Corpus Christi plants, Corpus Christi Refining Co. has completed an expansion of purchased facilities which provide for the handling of 8,000 bbl. of crude daily while Taylor Oil & Gas Co. placed a 5,000-bbl. Platforming unit on stream. Farther south at Brownsville, McBride Refining Co. announced a $2,500,000 expansion program which will increase plant capacity from 7,500 to 20,000 bbl. including catalytic reforming facilities.

Carthage Hydrocol . . . Considerable attention was focused on the Stanolind Oil & Gas Co. decision to take over the huge Carthage Hydrocol, Inc., gas-synthesis plant at Brownsville. The move required the assumption of a $17,500,000 loan granted Carthage by Reconstruction Finance Corp. and Stanolind also acquired the U. S. Industrials Chemicals Co. storage terminal here. This permits the gas-synthesis plant, Stanolind's adjacent chemical plant, and the terminal to be operated as a single unit.

The Carthage plant was originally designed to convert 90,000 M.c.f. of natural gas daily into about 7,000 bbl. of petroleum products and 300,000 lb. of chemicals. A byproduct chemical stream from the plant is the feed stock for the Stanolind plant, which separates and purifies products, including alcohols, aldehydes, ketones, and acids. Not having this feed stock available would have meant a considerable loss to Stanolind and partly contributed to their decision.

Although the Carthage plant has been plagued by shutdowns during its brief life, Stanolind is confident of its ultimate successful operation. E. F. Bullard, president, has stated that the process is sound, having been proved in pilot-plant operations. Once the right equipment has been installed, he looks to its full-capacity operation.

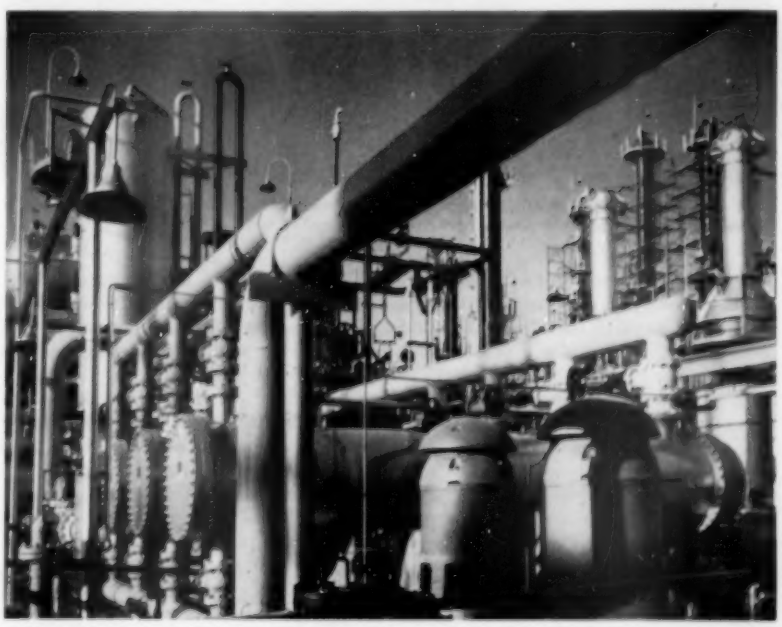
Pan-Am . . . In Texas City, Pan American Refining Corp. has been actively engaged in completing projects and starting new ones, at its 160,000-bbl. refinery. A 30,000-bbl. per day fluid cat cracker, the second one at the plant, has been placed into operation which will produce more than 9,000 bbl. of high-octane blending stock. Pan-Am also announced the building of a new high-pressure research lab for studying chemical reactions under pressure and plans to construct a plant to produce methyl mercaptan.

The methyl mercaptan process will use hydrogen sulfide and methanol as raw materials to produce 5,000,000 lb. of product per year. The process was developed by Pan-Am's research and development group. Onstream date for the plant has been set for the last quarter of 1954.

Finally, construction began on the 21,000-bbl. Ultraforming unit being built at the Texas City refinery. This is a new cat reforming process developed by Standard Oil Co. (Indiana) and will increase Pan-Am's output of high-octane products.

Also at Texas City, Republic Oil Refining Co. continued its expansion program with addition of a 5,500-bbl. Platforming unit.

Humble . . . At Baytown, Humble Oil & Refining Co. completed several facilities, with construction still under



ETHYLENE DICHLORIDE and vinyl chloride are manufactured in this unit at Monsanto's Texas City, Tex., plant. In the foreground are a reactor and a reactor cooling system.

THIS ETHYLENE PLANT, operated by Gulf at Port Arthur, Tex., has a capacity of 7,000,000 cu. ft. per day. It will soon have a companion plant with 8.2 million cubic feet capacity.

CAT CRACKER UNIT in left foreground works around the clock and has a throughput of 63,000 bbl. each 24 hours at Gulf's Port Arthur refinery.

way on a new pipe still for the replacement of older equipment. Completed were a paraxylene unit for production of 31 million pounds per year of this intermediate synthetic fiber production; a new propane deasphalting unit with a capacity for the production of 16,000 bbl. of clean gas-oil and 12,000 bbl. asphalt; a new catalytic light-ends unit for processing 37,000 M.c.f. of gas; and expanded facilities for alkylate production which raised output by 35 per cent to 9,400 bbl. daily. A sulfuric-acid regeneration plant is being built by Consolidated Chemical Industries to process acid sludges obtained from Humble's plant.

In the Houston area, Sinclair Refining Co. has completed an extensive expansion program with the placing onstream of a 35,000-bbl. crude unit and a 40,000-bbl. fluid cat cracker. The latter features a carbon monoxide boiler and a regenerator superheater in its design. Capacity of the plant now stands at 125,000 bbl. per day. A recent announcement revealed plans to construct a 30-ton per day sulfur-recovery unit at the refinery.

Eastern States Petroleum, Inc., put a 3,000-bbl. alkylation unit onstream at its Houston plant as part of a continuing $5,000,000, 3-year expansion program. Other facilities included in the program have been new Platforming, benzene-recovery, and solvent-refining units. Crown Central Petroleum Corp., meanwhile, announced plans to construct a 5,000-bbl. Houdriforming unit at its nearby plant.

At Sweeny, Tex., Phillips Petroleum Co. began construction on a 16,000-bbl. per day Platforming unit at its 85,000-bbl. plant. Production of finished aviation gasoline was begun at this plant during the year, it previously having made components which were blended elsewhere.

Expansion at scattered points throughout the state included completion of a 1,500-bbl. Platformer at Col-Tex Refining Co.'s Colorado City plant; general expansion of facilities at Danaho Refining Co., Pettus; and a 5,000-bbl. Platformer under way at Pontiac Refining Corp., Corpus Christi.

Port Arthur . . . In the concentrated Beaumont-Port Arthur area, activity continued on a high level. Magnolia Petroleum Co. has a 19,000-bbl. Thermofor catalytic reforming unit under construction with completion scheduled for late this year. Pure Oil Co., meanwhile, nears completion of a 17,750-bbl. Orthoflow fluid cat cracker at its Nederland refinery. Additional facilities include a poly unit and expansion of crude-distillation unit. Atlantic Refining Co. at Port Arthur has begun work on an 8,000-bbl. Atlantic reforming unit due for completion this year.

The Texas Co. has expansion under way at three of its four Texas plants. At Port Arthur, a 20,000-bbl. Platformer is being built; at Amarillo, a program to double the refinery is under way including a fluid cat cracker and a 4,800-bbl. Platformer. The El Paso plant is being expanded to also include a fluid unit plus a 3,300-bbl. Platformer.

Finally, Gulf Oil Corp. has announced that the largest Platformer in the world will be built at its 270,000-bbl. refinery at Port Arthur. The Platformer will have a 29,000-bbl. per day capacity and is due to be completed early 1955. A 4,000-bbl. cat poly unit is also under construction.

Petrochemicals

Gulf's activities at Port Arthur are not limited to refining, for located here are extensive ethylene and isooctyl alcohol producing facilities. Gulf made its first big step into ethylene production when it put onstream a 7,000,000-cu. ft. per day plant in March 1953. Plans have recently been announced for the more than doubling of this output with a new plant to be constructed which will have a capacity of 8,200,000 cu. ft. daily. Completion of the plant is expected in early 1955 and will give

TABLE 1—POSTWAR REFINING CRUDE-OIL CHARGE CAPACITIES, UNITED STATES AND TEXAS (PLANTS IN OPERATION)

Year	Thou. of bbl. U. S.	Texas
1954	8,428	2,323
1953	8,090	2,200
1952	7,340	2,087
1951	7,032	1,987
1950	6,540	1,789
1949	6,516	1,886
1948	5,970	1,734
1947	5,399	1,545
1946	5,288	1,496

Gulf a capacity in excess of 15,000,000 cu. ft. daily.

Product from this plant will play a large part in the polyethylene production in plants located along the Gulf Coast. Gulf has an ethylene pipeline in operation and has contracts with Du Pont and Spencer at Orange and Monsanto at Texas City, among others.

Polyethylene . . . Polyethylene is the hottest product in the Texas petrochemical picture today. Carbide & Carbon Chemicals is adding a $17,000,000 unit at Texas City for the production of 50 million pounds per year and has an additional unit planned at a completely new plant under construction at Seadrift, Calhoun County. Spencer plans to spend $25,000,000 at Orange for facilities with a capacity of 45 million pounds per year.

Dow at Freeport is investing 10 to 12 million dollars in a 25,000,000-lb. per year unit while Texas Eastman at Longview expects to produce 20 million pounds per year. Du Pont reports it is doubling its Orange facilities at a cost in excess of $10,000,000. On the basis of other plants being constructed, this would give them a production capacity in the neighborhood of 50 million pounds per year at this plant. Phillips, meanwhile, has not announced capacity or cost of its plant to be built at Houston, merely saying it will be "semi-commercial," probably an oversize pilot plant due to its using a new process.

The Koppers plant at Port Arthur will be constructed on a 1,000-acre site near Port Arthur. Operation is scheduled for mid-1955. The picture is temporarily completed with Monsanto's announcement of a 66-million-pound per year polyethylene unit to be built at Texas City. However, Monsanto previously announced its intention of increasing this by 50 per cent by 1957, but has made no additional statement.

Newcomers . . . Three newly organized companies have indicated plans to construct petrochemical plants in the state, while the well-known Warren Petroleum Corp. announced plans for its first venture into petrochemicals with a plant to be built near Conroe, Montgomery County.

Warren will obtain L.P.G. from the nearby Midland Gasoline Co.'s natural-gasoline process and employ a hydrocarbon oxidation process to produce pentaerythitol, methyl alcohol, and acetaldehyde. Annual production will be 2½ million pounds, 4 million pounds, and 2 million pounds, respectively.

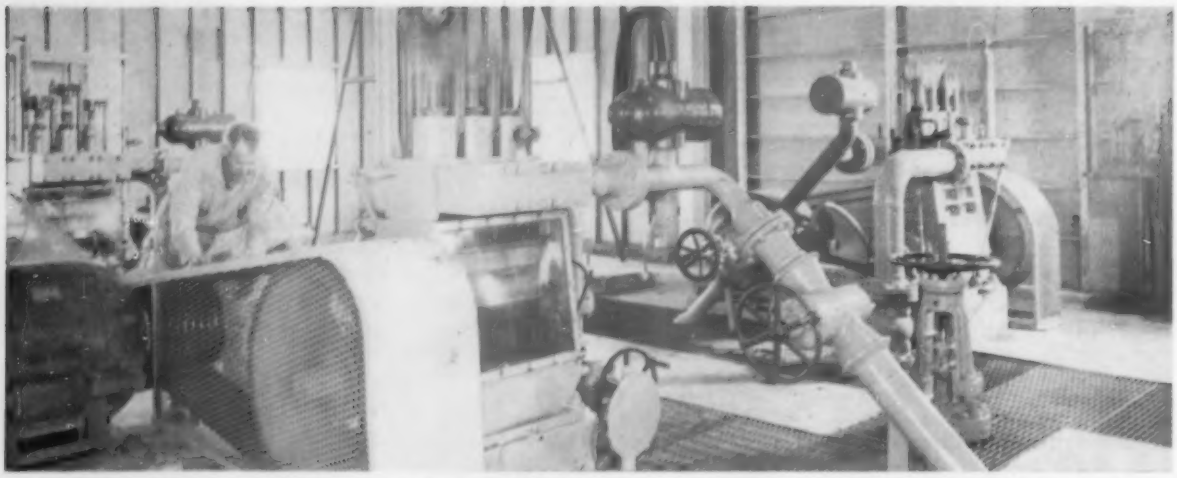
Petrocarbon Chemicals, Inc., newly organized subsidiary of Stendel Oil Corp., Santa Barbara, Calif., plans a $1,000,000 plant at Irving, near Dallas, for benzene-toluene-xylene production. Facilities will include a 1,000-bbl. per day Houdriforming unit.

United Chemical Co. was formed by Grover Hart, Dallas, to build an $18,000,000 plant at Timpson, on the Texas-Louisiana line, Shelby County. It is planned to use natural gas to produce 160-180 tons per day of urea and anhydrous ammonia, about 100 tons of which would be urea. Another company, Chillicothe Chemical Manufacturing Co., was also newly organized to build a $17,000,000 urea and ammonia

(Continued on page 260)

Table 2 — Operating Refineries in Texas

	Crude-oil charge, B/D
American Liberty Oil Co.: Mount Pleasant	14,000
Atlantic Refining Co.: Port Arthur	67,710
Bryson Pipe Line & Ref. Co., Inc.: Bryson	2,000
Col-Tex Refining Co.: Colorado City	12,000
Continental Oil Co.: Wichita Falls	8,547
Corpus Christi Refining Co. (formerly Inland Refining):	
Corpus Christi	8,000
Palestine	2,000
Cosden Petroleum Corp.: Big Spring	28,000
Crown Central Petroleum Corp.: Houston	30,000
Dallawax Co.: Kilgore	500
Danaho Refining Co.: Pettus	13,320
Eastern States Petroleum Co., Inc.: Houston	50,000
Eddy Refining Co.: Houston	2,250
Flint Chemical Co.: San Antonio	300
G. & B. Oil Co. (formerly Ute Oil & Gas Co.): Graham	700
Gladewater Refining Co.: Gladewater	2,500
Gulf Oil Corp.:	
Port Arthur	271,950
Sweetwater	8,325
Humble Oil & Refining Co.: Baytown	277,000
R. Lacy, Inc.: Big Sandy	4,000
Magnolia Petroleum Co.:	
Beaumont	199,800
Fort Worth	13,320
Matagorda Corp.: Bay City	1,850
McBride Refining Co., Inc.: La Blanca	2,000
McMurrey Refining Co.: Tyler	25,000
Monarch Refining Co.: San Antonio	2,500
Onyx Refining Co.: Hawley	6,500
Pan American Refining Corp.: Texas City	160,000
Panhandle Oil Corp.: Wichita Falls	8,000
Peerless Tank Cleaning Co.: Kilgore	1,000
Petroleum Products Refining & Producing Co.: Lueders	1,500
Petrolite Corp., Ltd.: Kilgore	700
Phillips Petroleum Co.:	
Phillips	80,000
Sweeny	85,000
Phoenix Refining Co.: San Antonio	3,500
Pontiac Refining Corp.: Corpus Christi	18,000
Port Fuel Co., Inc.: Brownsville	7,500
Premier Oil Refining Co.:	
Arp	5,000
Baird	2,500
Fort Worth	7,500
Longview	4,200
Pure Oil Co.: Nederland	55,000
Rado Refining Co.: McAllen	2,000
Republic Oil Refining Co.: Texas City	42,500
Sid Richardson Refining Co.: Texas City	18,000
Shamrock Oil & Gas Corp.: Sunray	12,000
Shell Oil Co.: Houston	125,000
Sinclair Refining Co.:	
Corpus Christi	28,000
Houston	125,000
Skelly Oil Co.: Longview	7,000
Southwestern Oil & Ref. Co.: Corpus Christi	43,000
Standard Oil Co. of Texas: El Paso	30,000
Suntide Refining Co.: Corpus Christi	35,000
Taylor Oil & Gas Co.: Corpus Christi	40,000
Taylor Oil & Gas Co. and Mayfair Minerals, Inc. (Taylor Oil & Gas, Operator): Port Isabel	12,000
Texas City Refining, Inc.: Texas City	40,000
The Texas Co.:	
Amarillo	8,500
El Paso	5,500
Port Arthur	210,000
Port Neches	40,000
Three Rivers Refinery: Three Rivers	1,500
Tydal Co.: Gainesville	2,000
Wickett Refining Co.: Wickett	3,000
Total	2,323,472

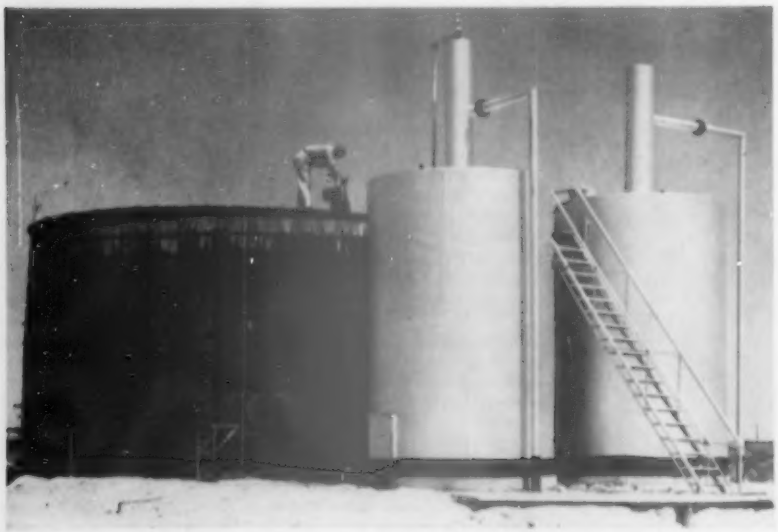


"HOT" WATER-FLOOD AREA in West Texas is South Ward field in Ward County. Operators have been applying for permits to flood the Yates sand here at an increasing rate since 1950. One of the first was D. D. Feldman Oil & Gas Co. which kicked off a flood on its 640-acre D. Olcott et al. lease in 1950. Here is the high-pressure water-injection plant on the Olcott lease.

500 Secondary-Recovery Projects Active in Texas

From 254 projects in 1952 to more than 600 in 1954 —that's the rapid rate at which Texas operators are plunging into secondary-recovery efforts. At stake: billions of barrels of untapped oil.

by Robert J. Enright
Texas District Editor



INPUT WATER IS TREATED by Jake Stubblefield, plant operator for D. D. Feldman Oil & Gas Co., for the firm's water-flood project on its D. Olcott et al. lease. Tank at left is for reserve water, those at right are settling tanks.

SECONDARY recovery* in Texas, slower to catch on there than in many other parts of the country, now is gaining ground so fast in the state that statisticians are hard put to keep up.

At January 1, 1952, there were 254 active gas or water-injection projects in Texas, according to a comprehensive survey conducted by the Texas Railroad Commission. This figure did not include cycling projects in gas-condensate reservoirs.

At the beginning of this year, the Railroad Commission preliminarily lists the astounding total of 613 gas or water-injection projects in the state either in operation or for which applications to begin operations had been approved.

Not all of these projects were active by the first of the year. Few of the sizable number of such operations approved by the commission during the last few months of 1953 were under way. Again, plans for some of the projects approved by the commission during the course of the 2 years since the commission's last survey were dropped by the operator without notification to the commission, and a number of the older projects which were active at the first of 1952 have since been abandoned. On the other hand, some others are operating which the commission admits have not been approved by it and which it knows nothing about.

*Secondary-recovery operations in this article, for the purpose of brevity, include both secondary-recovery and pressure-maintenance projects as defined by the American Petroleum Institute. Both according to definition are intended to increase ultimate recovery. The only distinction is the point in the life of a field at which the project is installed, with a secondary-recovery operation initiated when the field is near depletion, a pressure-maintenance project earlier in the life of the field.

BIGGEST INDIVIDUAL PROJECT of Magnolia Petroleum Co. will be its new Northwest Burkburnett Extension water flood still under development in Wichita County, North Texas. Shown here is its pump station.

SUCCESS OF FIRST MAGNOLIA FLOOD in North Texas launched 9½ years ago on this, its 160-acre J. G. Goins lease in West Burkburnett field, led to company's present extensive water-flooding program in the area. Pictured is Magnolia's Goins tank battery.

In view of these factors, it is believed that the number of gas and water-injection projects actually active in the state at the first of this year could be estimated roughly at about 500 or a little over—again not counting cycling operations in gas and condensate fields. A more exact figure will be available when the commission completes work now in progress to update the 1952 study.

The approximate 500 secondary-recovery projects active as of January 1, 1954, means that producers in the state in the recent surge to secondary recovery have at least doubled the number of projects in the past 2 years. The feat is even more remarkable when it is considered that the first water-flood project in the state was begun in North Texas 19 years ago in 1935 and the state's first gas-injection program of record was launched 28 years ago in 1926, also in North Texas.

Railroad Commission records show 354 applications approved for injection projects in the 2 years ended January 1, 1954. It is estimated roughly that about 290 of these actually were in operation at the start of the year.

North Texas

The North Texas region, including Railroad Commission Districts 7-B and 9, has become known as "the" water-flood area of Texas. This is due primarily to the shallow depth of producing formations, the large percentage of stripper wells, solution-gas type of reservoirs, and the low cost of development.

Most water-flood production is in Cisco sands of Pennsylvanian age. These include the Gunsite* and Thomas sands in Archer, Baylor, Jack, Young, Wilbarger, and southern Wichita counties; the Thornberry, Burk, and other Cisco sands in northern Clay and Wichita counties; and the Cook, Cross Cut, Tannehill, and Bluff Creek sands in the Abilene district.

Canyon sands of Pennsylvanian age have operations in Cooke and Montague counties at depths ranging from 800 to 1,100 ft. and in Wilbarger County at 1,800 to 2,400 ft. The Cisco group outcrops in Young and Stevens counties.

The shallow fields, for the most part, are located on plunging noses and small irregularly shaped domes along the two dominant structural features in the North Central Texas area—the Bend arch and the Red River uplift.

Oil accumulations, occurring on crests and flanks, result from structural or stratigraphic trapping. Most of the fields produce under natural-gas drive and are well adapted to secondary-recovery techniques.

The shallow sands, for the most part, are much more porous and permeable than those of Pennsylvania and in many instances more so than those of the Mid-Continent. Projects are active in formations varying from clean, coarse-grained sand with high permeability to shaly, fine-grained sand.

Productive area of the majority of the secondary-recovery projects in the area is relatively small, generally falling between 12 and 500 acres. Depth ranges from the shallow Permian, Stine, and Tannehill sands at 250-300 ft. at the shallowest points to the Bend series at about 6,100 ft. Relatively few are below 2,000 ft. Producing formations in the area generally average from 5 to 20 ft. thick.

Activity . . . Commission figures show 152 water or gas-injection projects in operation or for which applications have been approved in District 9 and another 109 in District 7-B. This totals out to 261 projects for the entire North Texas area—or about 44.2 per cent, nearly half, of all secondary-recovery operations in the state.

Of the 152 projects in District 9, 121 are listed as water floods, 27 as gas-injection operations, and 4 as both gas and water-injection projects. In District 7-B, 92 are water floods, 13 gas-injection projects, and 4 are combination operations.

A total of 177 of the 261 North Texas projects, or a big 64 per cent, have been given the commission go-ahead in the past 2 years. The new projects break down into 102 located in District 9—including 84 water floods, 15 gas-injection projects, and 3 gas and water-injection operations—and 75 in District 7-B—including 62 water floods,

*What is referred to as the Gunsite sand in this article actually is the Swastika sand. This formation has come to be called the Gunsight through general usage and will be referred to as the Gunsight to avoid confusion. The Gunsight actually is a limestone formation directly overlying the Swastika. As far as is known, there is only one secondary-recovery project in the Gunsight lime.

10 gas-injection operations, and 3 combination projects.

New projects in North Texas constitute about 43.5 per cent of all approved by the commission during the past 2 years. North Texas' share of the new projects thus is being maintained at about the same rate as its share of total projects in the state.

There currently are 23 of a total of 39 counties in North Texas with secondary-recovery projects—11 of them in the 15-county District 9, and 12 in the 24-county District 7-B.

These counties in District 9 are: Archer, Baylor, Clay, Cooke, Denton, Jack, Knox, Montague, Wichita, Wilbarger, and Young. Those in District 7-B are: Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Stevens, Shackelford, Taylor, and Throckmorton.

Top secondary-recovery county in North Texas continues to be Wichita County in District 9. The county had 49 projects either active or approved by the first of the year—40 of them water floods.

A big share of the total, 29 (24 of them floods) were approved in the past 2 years. The biggest portion of these projects, as in the North Texas area as a whole, are in the Cisco sand series encountered in Wichita County at a depth of from 675 to 1,700 ft.

Archer County in District 9 lays claim to the second ranking as to the biggest number of projects with 27 approved. Sixteen of these were given the green light since January 1, 1952. Here, operations are more evenly balanced with 13 floods, 13 gas-injection projects, and 1 combination operation. Water flooding is gaining in popularity, however, since 12 of the 16 operations approved in the last 2 years have been water-injection projects.

Though Archer County holds the No. 2 ranking at present, Shackelford County in District 7-B is edging up fast. Shackelford has 25—19 of them passed on favorably by the commission in the last 2 years.

Other high-ranking counties in the area as regards number of projects are: Jones County was 15, Throckmorton with 11, and Brown with 11, all in District 7-B; and Clay County with 16 and Jack County with 11 in District 9. Young County also is extremely active.

Wichita successes . . . Some of the most spectacular results of secondary-recovery efforts in North Texas have been in the West Burkburnett area of Wichita County, just south of the Oklahoma line.

Magnolia Petroleum Co. pioneered in the area, starting a pilot water flood on its 160-acre J. G. Goins lease in the field's Gunsite pay in July 1944. The project boosted production from the lease from 53 bbl. daily at the start to a peak of 900 bbl. daily.

Production of secondary oil from this lease has already passed by far that produced by primary methods. The lease, when the project was initiated in 1944, had produced 629,673 bbl. of oil by primary recovery. Secondary oil produced since then is nearing 1,000,000 bbl.

Success of the pilot project led Magnolia to extend it in 1949, and this has been continued gradually until the West Burkburnett project now takes in well over 2,000 acres. Also largely because of the Goins success, the company now has several other flood projects either operating or under development.

The largest of these is its new operation in Northwest Burkburnett Extension field which will take in about 2,800 proved acres and a total of about 284 producing and injection wells.

West Texas

Great interest has been exhibited by operators in West Texas, comprising Railroad Commission Districts 7-C and 8, in secondary-recovery operations in recent years in Permian dolomites and sands ranging downward from about 2,400 ft.

Most of these projects recently have been water floods, although there have been a considerable number of gas-injection projects initiated in the limestone reservoirs.

As of the first of 1954, the Railroad Commission had approved 131 secondary-recovery projects for this area, comprising Districts 7-C and 8.

Of the total 85 were water floods, 40 were gas-injection projects, and 6 were combination operations.

District 8 was far out in front with 111 of the total 131 operations. In this district 79 were water floods, 26 gas-injection operations, and 6 combination water and gas-injection projects. In District 7-C there were 14 gas-injection projects and 6 water floods.

About 80 of the total 131 projects, or about 60 per cent, have been approved in the 2 years from January 1, 1952, to January 1, 1954—65 of them in District 8, 15 in District 7-C. Of these "new" projects in District 8, 12 were approved for the Yates sand, a Permian dolomite, in North Ward-Estes field and another 9 given the commission blessing in South Ward field, also in Yates. Both fields are in Ward County. Secondary-recovery activity in both fields has continued at a high rate since the first of the year, with several new projects approved. Most of these projects are small, along the nature of the majority of North Texas floods. The biggest in recent months is Gulf Oil Corp.'s project, proposed early in April, for its properties in North Ward-Estes. This project takes in about 2,292 productive acres in the field and 147 producing wells.

The North Ward-Estes reservoir, which takes in about 22,600 acres, is a north-south-trending anticlinal structure composed of blanket shaly sands separated by impermeable dolomite with occasional sand stringers. Exact limits of the field are still in process of being defined. The Yates in the area is topped at an average depth of about 2,600 ft.

A great many projects also have been initiated in Peyton and Pecos Valley High Gravity fields in this area, and more recently in Pecos Valley Low Gravity field in Pecos and Ward counties.

Not all the secondary-recovery projects in West Texas, however, are small—not by any means.

In fact three of the biggest secondary-recovery operations in the world, from the standpoint of acreage, either have been or are expected to be approved for this area.

These are:

. . . The SACROC Unit project in the Canyon Reef formation of Kelly-Snyder field in Scurry County, which takes in nearly 50,000 productive acres and more than 1,200 producing wells. This, the world's biggest project from the standpoint of acreage (excepting East Texas field) and of additional oil recovery involves both water and gas injection—water in a line-type flood along the crest of the producing formation and gas in the northern end of the field. SACROC estimates more than 720,000,000 bbl. of additional oil will be recovered as a result of the project. The program was approved early in 1953.

. . . The huge water and gas-injection program in the 4,200-ft. San Andres reservoir of Goldsmith field, Ector County. The unit, operated by Gulf Oil Corp. for itself, Phillips Petroleum Co., and Pure Oil Co., takes in 14,000 productive acres and 557 producing wells. It is thought that the operation, which involves injection of water on the flanks and gas injection into the top of the south dome, will result in the recovery of roughly 70,000,000 bbl. of additional oil. This project also was approved by the commission early last year.

. . . The proposed gas-injection project in Levelland field of Hockley and Cochran counties, which was laid before the Railroad Commission very recently by Stanolind Oil & Gas Co. This big operation would take in as a unit, between 16,000 and 21,500 acres

(Continued on page 257)

PETROCHEMICALS are made from petroleum and natural gas in this, the organic area of Dow Chemical Co.'s Plant A.

AMMONIA TO VINYLIDENE CHLORIDE

Dow Adopts Petroleum Techniques in Texas

Petrochemical installations near Freeport, Tex., use L.P.G., natural gas, and benzene as prime raw materials in synthesizing wide range of products.

by F. Lawrence Resen
Gulf Coast District Editor

DOW CHEMICAL CO.'s Texas division stands forth as a significant and quite representative example of petrochemical installations throughout the state.

Starting from scratch during the immediate pre-World War II years, its organic section has been in a continuous state of expansion ever since. Both variety and volume of products have increased, with current expansion plans due to add two new groups of products —glycerols and polyethylenes.

With facilities concentrated around Freeport, immediately adjacent to the Gulf of Mexico, Dow has been able to utilize the petroleum resources of the Gulf Coast in its growth. Raw materials fed into the two plants located here include liquefied petroleum gases from nearby gasoline and cycling plants, natural gas from fields in the locality, and benzene from refinery sources.

An offshoot of the division's expansion has been the establishment of a pipeline gathering system of a substantial nature—more than 600 miles in all—used to carry L.P.G. and gas into the plant as well as to carry products to Texas City for use at plants located there. A recent development has been the setting up of underground-storage facilities for handling L.P.G.; while an early development was the organization of Brazos Oil & Gas Co., a wholly owned subsidiary whose original purpose was to insure the Texas division of ample long-range gas resources. Thus, while relying on the petroleum industry as a source of raw materials, Dow has also adopted some of its techniques in production, transportation and storage.

Synthesis

Petrochemical production by Dow hinges largely around the use of ethylene as a base upon which to synthesize further products; propylene in glycol manufacture, and chlorination of methane into four main products.

Incoming liquefied petroleum gases are cracked in a light-hydrocarbon unit, with separation of ethylene and propylene being effected and byproducts of butadiene and benzene realized. One ethylene stream is directed to the styrene plant, where it is first combined with benzene to ethyl benzene, which upon dehydrogenation results in styrene, a product shipped out for further synthetic purposes.

A portion of the styrene is combined with butadiene and water to produce styrene-butadiene latex, a milky-white suspension of synthetic rubber particles used to formulate water-base paints.

Another ethylene stream is feed stock for the glycol unit. It is first reacted to the chlorohydrin which is subjected to alkaline hydrolysis to produce ethylene glycol. An intermediate, ethylene oxide, is partially withdrawn to be used as finished product.

Chlorination of a portion of the ethylene stream results in ethylene dichloride, which may be withdrawn as product or further chlorinated to yield a wide range of products including vinyl chloride, vinylidene chloride, trichloroethylene, and perchloroethylene.

Ethylene will also be used in a new unit to be constructed which will polymerize the gas to polyethylene.

Propylene from the light hydrocarbon unit is used in the preparation of glycol in a similar manner as the ethylene stream. It is processed to the chlorohydrin, then to the oxide and finally the glycol, with propylene oxide being a product in this case also. However, byproducts are withdrawn at various steps in the syntheses to produce various ethers, while the glycols produced include triethylene, tripropylene, and trichloroethylene glycols.

Chlorination of methane is accomplished to produce methyl and methylene chloride, with further chlorination resulting in production of chloroform and carbon tetrachloride to complete the main process scheme.

Another product to be produced upon completion of projected facilities will be glycerin, which will use propylene as a raw material and use a Dow process.

Ethylene production . . . The initial step

ADDITIONAL PETROCHEMICALS are made in Dow's Freeport plant in the organic area of Plant B.

in the synthesis of derivatives is the production of ethylene and propylene from liquefied petroleum gases. These are obtained from several gasoline and cycling plants and stored underground in a salt cavity, recently washed out for this purpose. The L.P.G. is charged to a heater where thermal cracking takes place, with the cracked gases being compressed and separated in a group of three columns. Methane and hydrogen are withdrawn from the first column, bottoms charged to the second column, where ethylene is removed, and the bottoms then used as charge for the third column where propylene is removed overhead.

Bottoms from this latter column pass to the byproduct recovery section. Here, the C_4's are separated overhead in the initial column, and are charged to an extraction unit, where butadiene is recovered and charged to a final column for purification. Bottoms from the initial separation column are stabilized, with overhead going to fuel and bottoms charged to a final column where a small amount of benzene is recovered, and tarry residue withdrawn.

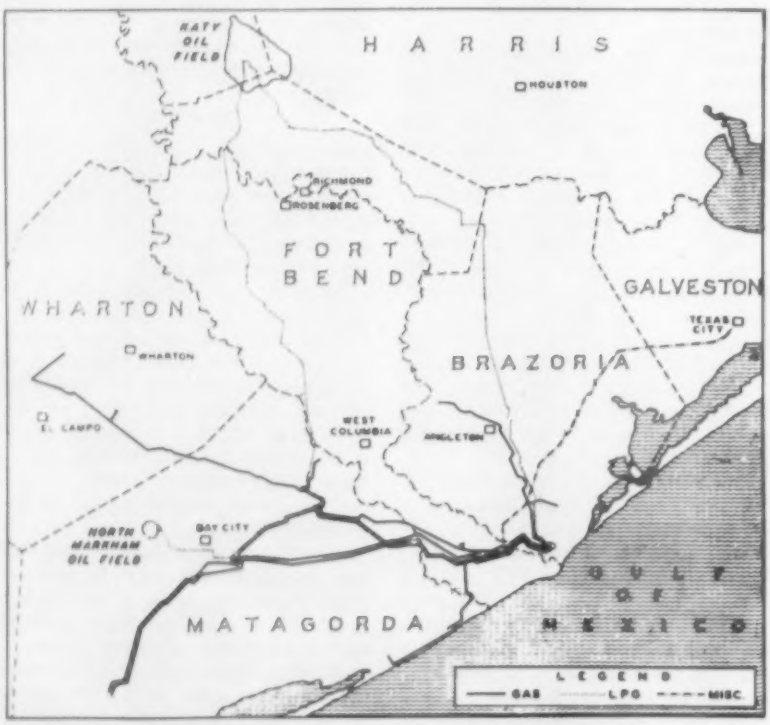
Chlorination . . . An elaboration of the methane chlorination process finds chlorine and purified methane being injected into a primary vapor-phase reactor.

The chlorinated gas stream containing excess methane, hydrochloric acids, and small amounts of chlorine goes next into an absorption column where the chlorinated hydrocarbons formed are absorbed in a mixture of carbon tetrachloride and chloroform, while methane and hydrochloric acid escape from the top of the column. The liquid effluent is then fed to a stripping column where it is freed from the lower chlorinated products and chlorine.

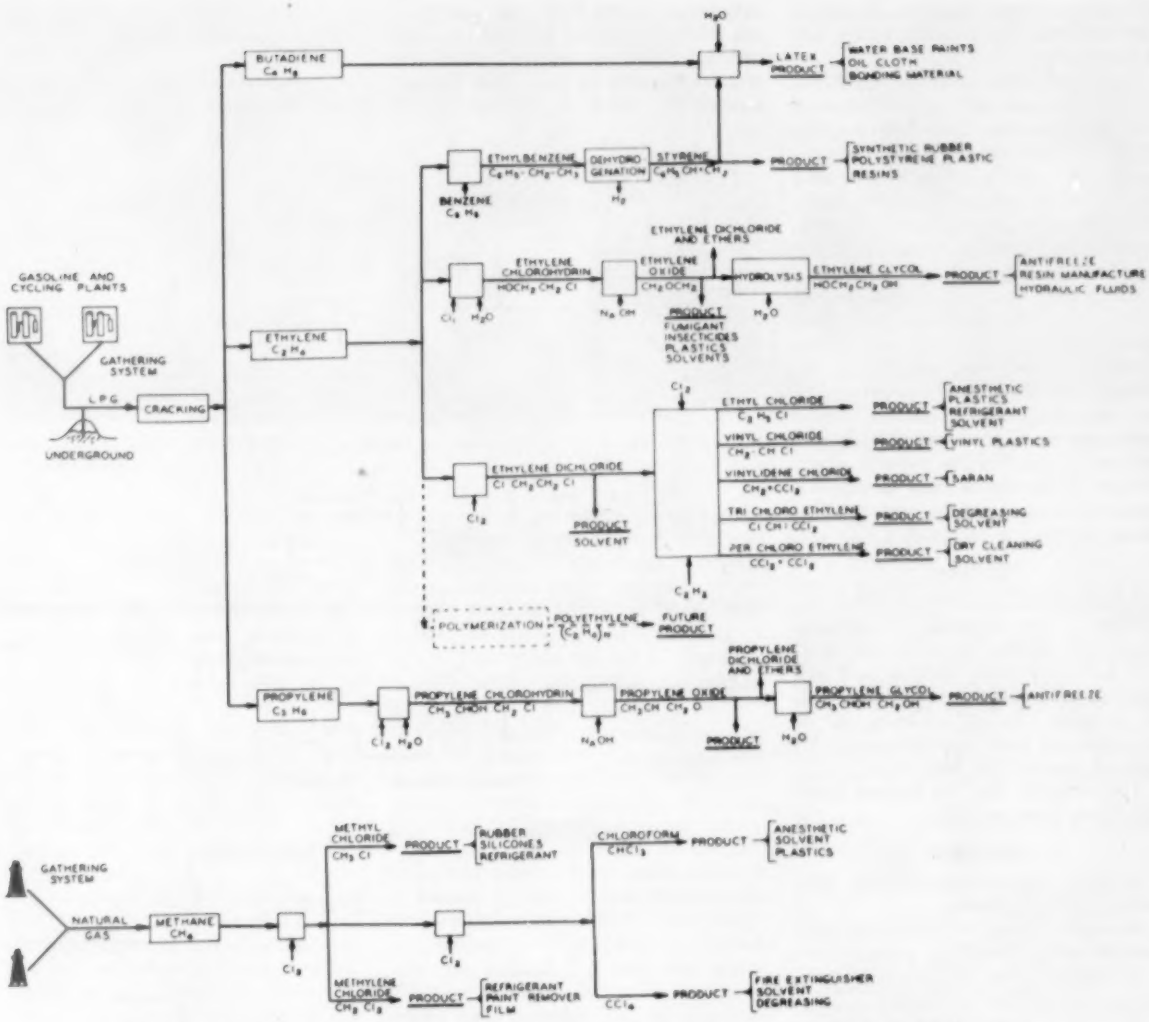
The stream from the top of the absorption column, termed major gas, consists mainly of hydrochloric acid and excess methane, whereas the stream escaping from the stripping column, termed minor gas, contains the lower chlorinated hydrocarbons, chlorine, and a substantial quantity of hydrochloric acid because of the latter's solubility in the carbon tet-chloroform mixture. The high-boiling fraction of the chlorinated hydrocarbons remains in the circulating liquid; it is separated later by distillation.

Minor stream . . . The minor stream passes through an adiabatic column fed with hot water. The chlorinated hydrocarbons, saturated with water vapor but containing small quantities of hydrochloric acid and chlorine, escape from the top, while hot dilute acid, containing a small amount of hydrogen chloride, flows from the bottom of the column through an intercooler into the top of a second water-cooled absorption column. This column is fed with the major stream from the absorption column containing the bulk of the hydrogen chloride and forms commercial 32 per cent hydrochloric acid.

The escaping methane, saturated with water vapor and containing some hydrogen chloride, goes first through a sulfuric acid drying column and is then



A SERIES OF PIPELINES feed gas, L.P.G., etc., into Dow Chemical Co.'s Freeport plant.



PETROCHEMICAL OPERATIONS of the Freeport plant are outlined in this schematic line-and-box diagram.

compressed and recycled into the reactor system.

The contaminated chlorinated hydrocarbons pass from the adiabatic column through a neutralizer and dryer and are then compressed and charged to distillation columns where methyl and methylene chloride are separated from the mixture.

Bottoms from the methylene chloride column plus accumulated material from the stripping column are fed into a liquid-phase reactor, where the remaining methylene chloride is converted into chloroform and some carbon tet.

The effluent from the reactor overflows into a storage tank which feeds into a topping column. Here unconverted methylene chloride is taken overhead and recycled through the liquid-phase chlorinator, while the bottom effluent is fed into the chloroform refining still.

The bottom stream from the chloroform still is fed into a second liquid-phase reactor, where it is continuously chlorinated to carbon tetrachloride, which is refined in an additional column.

Glycols . . . In the glycol unit, either ethylene or propylene may be used as feed stock, with the outputs being respectively ethylene oxide and ethylene glycol, and propylene oxide and propylene glycol. Side reactions taking place produce corresponding dichlorides and ethers which are recovered.

In simplified flow, using ethylene as the olefin throughout for convenience, the charge consists of water, chlorine, and ethylene, which are reacted to produce the intermediate ethylene chlorohydrin. This is then reacted with alkali to produce crude ethylene oxide, which is compressed and charged to the purification column. Here, ethylene oxide stream is withdrawn overhead, while dichlorides and ethers produced during the chlorohydrin reaction are withdrawn from the bottom as crude byproduct, to be further purified.

Ethylene oxide, meanwhile, may be withdrawn as product or undergo hydrolysis to crude ethylene glycol. Excess water is evaporated and the glycol purified before being formulated to antifreeze, or else it may be marketed as is prior to formulation.

Styrene . . . Manufacture of styrene (vinylbenzene) is accomplished using the conventional method of catalytically dehydrogenating ethyl benzene. Ethyl benzene is produced by the alkylation of dry benzene in the presence of aluminum chloride.

Benzene and ethylene are continuously fed into an alkylating tower operating at essentially atmospheric pressure. A small amount of ethyl chloride is added to the ethylene feed which

acts as a catalyst promoter. Granular aluminum chloride is added at the top of the tower.

The aluminum chloride combines with the benzene and ethyl benzene to form a hydrocarbon insoluble complex. Crude alkylate and entrained complex are cooled, with the complex separated from the crude mixture in settling tanks. This complex is then pumped to a high-temperature dealkylator where it is broken down and hydrocarbons recovered.

Crude ethyl benzene from the settling tanks is caustic-scrubbed and then passed through a fractionating section. Benzene and polyethylenebenzenes are removed and the product is charged to the dehydrogenation reactor where crude styrene is produced. This passes through a purification system where vacuum distillation is used to separate components for recycle and purified styrene product is obtained.

Pipelines

An interesting aspect of the Dow operations is the network of pipelines which has grown to serve the plant with L.P.G. for raw material and natural gas, used both for fuel and synthesis purposes. In all, counting all of the gathering lines, approximately 600 miles of pipeline has been laid.

The network may be broken down into trunk lines as follows:

Gas Lines

18 miles, 8-in.—Angleton field, Brazoria County, to plants.

60 miles, 14-in. — Hutchins-Kubela field, Wharton County, to plants.

65 miles, 12-in.—Collegeport field, Matagorda County, to plants.

65 miles, 16-in.—Loop to Collegeport field.

L.P.G. Lines

82 miles, 4-in.—Katy cycling plant, Waller County, to plants.

57 miles, 6-in.—Katy cycling plant to Old Ocean field, Brazoria County.

31 miles, 8-in.—Old Ocean to plants.

4 miles, 4-in.—Branch to Pledger gas plant to junction north of Old Ocean.

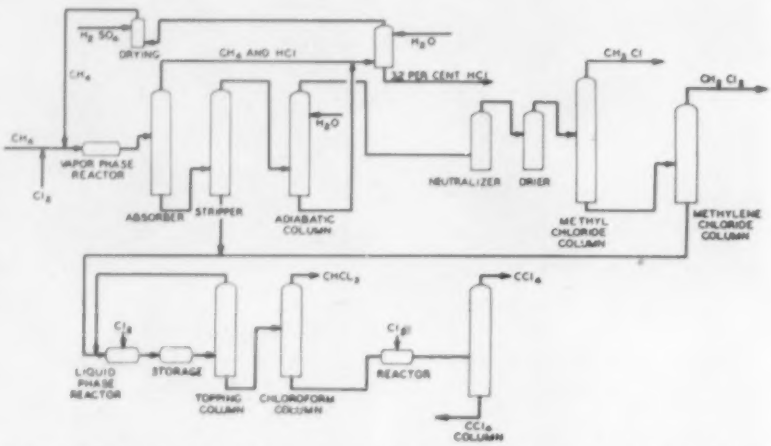
10 miles, 4-in. and 15 miles, 8-in.—Branch from North Markham gasoline plant to tie in with main L.P.G. line at Old Ocean.

In addition, a 4-in. line runs 42 miles to Texas City, and is used to carry products or raw materials in either direction, depending on requirements throughout the year.

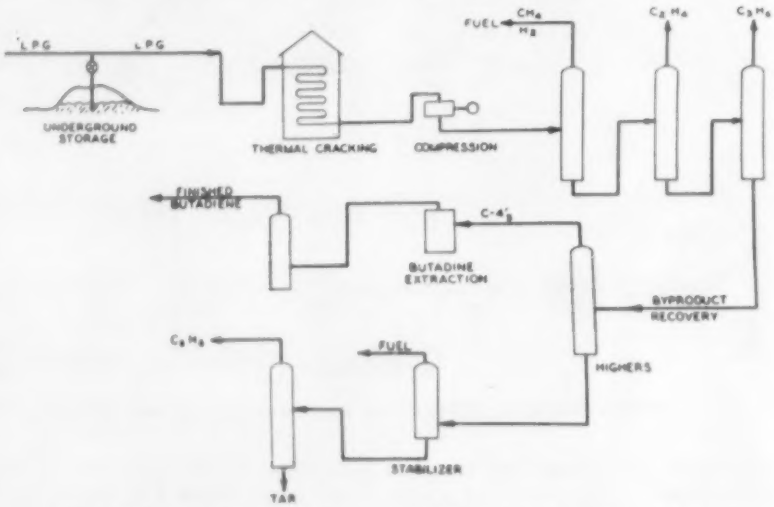
The gas-gathering system is used to carry approximately 200,000 M.c.f. of gas into the plants daily for use as fuel and raw materials. A considerable amount of this is used in the generation of electric power for inorganic production.

Under normal operations, the gas is dehydrated in the field with scrubbers and triethylene glycol dehydration units installed either on individual leases, or at a central field battery. Once the gas reaches the plants its pressure is reduced and it enters a distribution system for plant-wide operations.

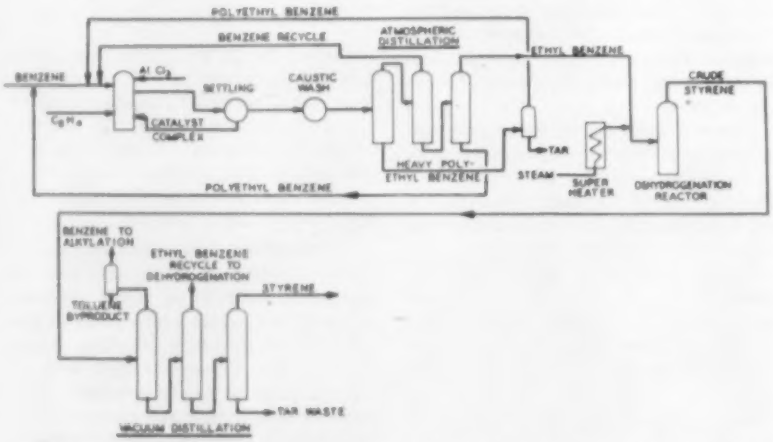
A recent addition to the facilities has been underground storage cavities at nearby Stratton Ridge. Provisions have



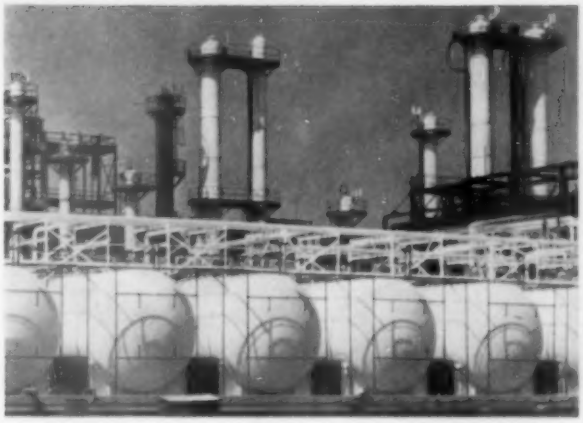
PROCESS OPERATIONS are shown schematically for the production of carbon tetrachloride.



BENZENE AND BUTADIENE are produced from L.P.G. at the Freeport plant.



STYRENE is produced from benzene and ethylene using aluminum chloride catalyst.



VINYL-VINYLIDENE CHLORIDE is produced in this unit by Dow's Texas division.

ETHYLENE DICHLORIDE is produced in this unit at the Freeport plant.

been made to store 100,000 bbl. of L.P.G., using conventional injection and removal techniques, with a water cushion. This provides an uninterrupted flow of L.P.G. for normal plant operations even during peak demand periods of the winter months, when home heating increases consumption of the petroleum gases.

The operation of the pipelines is done by a regular department of Dow's which is responsible for all normal pipeline operations. Engineering is done by Dow's engineering department. Actual laying of new lines is done under contract, however.

To facilitate these operations, air strips have been constructed at strategic points on the pipeline network for rapid movement of personnel and supplies. A radio system is also in operation, with a microwave network due to be installed.

Water

In any processing plant, water plays a critical role, and at Dow provisions have been made to take advantage of the normal watershed as well as sea water in cooling operations. The particular need for sea water is in magnesium production, however, and although this is far removed from petrochemical operations, the salt-water supply situation is so interesting, it might be well to mention it in this discussion.

Some 20 years ago, the Brazos River was diverted—for flood-control purposes—from its channel between the towns of Velasco and Freeport, so that it would enter the Gulf of Mexico southwest of its normal channel. This meant that a finger of the old channel was left as Freeport Harbor which connected to the gulf. Water removed from Freeport Harbor and dumped into the new channel of the Brazos River would then be carried out into the gulf by prevailing currents, without accumulating near the mouth of the harbor.

This, then, played a considerable part in the location of the plants, for when magnesium and other elements are extracted from sea water, it is desirable to dispose of the diluted water in such a way that it will not act to dilute incoming water, and this is the case at Freeport.

Under the present setup, the plants used 1.5 million acre-feet of sea water in 1953 for extraction and cooling purposes. Permits are held for the withdrawal of 2.37 million acre-feet yearly. The water reaches Plant B—farthest inland—through a barge canal, where it is picked up and pumped through the distribution system. Plant A has pumping stations in both Freeport Harbor and the barge canal, with the water traveling through concrete flumes from where it is pumped into the distribution system.

Fresh water . . . Two reservoirs—one nearing completion—are used for fresh-water-supply purposes. River water is picked up from the Brazos River and pumped into the Harris Reservoir, about 45 river miles upstream by two 50,000-g.p.m. pumps. This is a 1,600-acre reservoir having a 9,000 acre-ft. capacity. Water is siphoned from here to flow by gravity down Oyster Creek to a pumping station at Lake Jackson, about 8 miles from Plant B.

From here it is picked up by four pumps with a total 75,000-g.p.m. capacity and pumped into a canal to carry it through Plant B and on into a 40-ft. flume to Plant A. A diversion canal is being built to bypass Plant B, which will use the stub end of the present canal as a plant reservoir. At the plants the water is treated for removal of silt and then enters a distribution system for the plant requirements.

The Brazoria Reservoir, which is nearing completion, covers 1,900 acres and has a capacity of 19,000 acre-ft. This is located about 13 miles from Plant B and picks up Brazos River water through two 90,000-g.p.m. pumps. Water will likewise be siphoned from here to flow down Buffalo Camp Bayou and then join the Lake Jackson Canal to the plants. During 1953, 117,000 acre-ft. of river water was used at the plants. Permits are held by Dow for the use of 177,500 acre-ft.

Products . . . Organic products made at Dow's Texas division include:

Ammonia	Magnesium oxide
Carbon tetrachloride	Methyl chloride
Caustic soda	Methyl chloroform
Chlorine	Methylene chloride
Chloroform	Perchloroethylene
Dichloroethyl ether	Polyglycols
Dichloroisopropyl ether	Propylene dichloride
	Propylene glycol
Diethylene glycol	Propylene oxide
Dipropylene glycol	Sodium orthosilicate
Ethyl chloride	Styrene
Ethylene	Tetraethylene glycol
Ethylene glycol	Toluene
Ethylene oxide	Triethylene glycol
Hydrochloric acid	Tripropylene glycol
Latex	Vinyl chloride
Magnesium	Vinylidene chloride

Personnel . . . Key personnel at the plant are:

Dr. A. P. Beutel, vice president and general manager; O. E. Beutel, traffic manager; J. P. Bryan, attorney; N. D. Griswold, assistant general manager; D. J. Landsborough, controller; I. A. Oden, chief auditor; H. G. Roebke, assistant general manager.

D. L. Rooke, manager of industrial relations; W. E. Roush, assistant general manager; H. D. Sherbrook, general superintendent of maintenance and construction; C. M. Shigley, director of technical research; J. R. Stein, assistant general manager; S. I. Stratton, general manager's assistant; E. B. Barnes, director of organic research.

THIS ORGANIC PETROCHEMICAL PLANT of Celanese Corp. of America produces oxidized hydrocarbon chemicals from propane and butane. Located 30 miles southwest of Corpus Christi, this unit obtains its raw materials and fuel by private pipeline from LaGloria Corp.'s and The Chicago Corp.'s cycling plants.

Texas in Top Spot in Petrochemicals Manufacture—Here's Why

by Frank H. Dotterweich

THE synthetic organic petrochemical plant in Texas may be classified as a basic industry whose raw materials are, for the most part, unprocessed and whose products generally are raw materials for other industries. Therefore, as a basic chemical industry, the synthetic petrochemical plant must obtain its raw materials advantageously relative to price and quality and have access to cheap fuel or power.

Water, although not generally classified as a basic raw material, can be an all-important factor as a raw material and may also be required for evaporation and cooling purposes.

Other factors in plant location are: plant requirements (topography, acreage, climate, etc.), labor, transportation, and markets. Considering the above factors in determining the location of a synthetic organic petrochemical plant, the reason for the selection of Texas by management, and primarily the Gulf Coast of Texas, for such locations is readily seen.

Author is director, Division of Engineering, Texas College of Arts and Industries, Kingsville.

THESE FRACTIONATING TOWERS are part of the ethylene oxide unit at the Neches plant of Jefferson Chemical Co., Inc.

Personnel, Terrain, Transportation

Along the coast are found adequate technical personnel trained in the many oil refineries established at an earlier date. A continuous supply of young men from the many technical institutions of Texas supplements the supply annually.

Favorable terrain with a mild climate throughout the year simplifies and reduces building and maintenance costs. Public utilities stand ready with dependable and reasonable services where required. The various Texas agencies, including that of law enforcement, insure all forms of protection.

Transportation to and from and along the coast is assured by constantly improved facilities for deep-water shipping; the intercoastal canal provides protected coastwise shipping; railroads, airlines, pipelines, and the Texas highways of national repute offer satisfactory methods of transportation for men and material.

These factors, combined with satisfactory fuel and raw-material contracts with adequate water supplies, have seen the first and remarkable phase of the organic petrochemical development take place within 200 miles of Houston. Other sections of Texas have benefited by the expansion of the petrochemical industry, but not to such a marked degree.

With the exception of carbon-black plants, whose locations are generally fixed in or near the producing field, the location of future petrochemical plants in Texas will find the determining factors to be raw material, fuel, and available water.

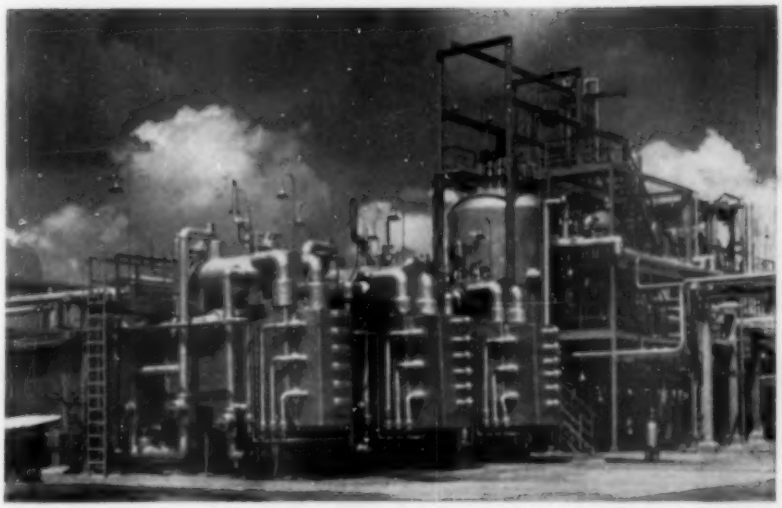
Raw-Material Requirements

The use of natural gas with its heavier components as a chemical raw material has experienced a rapid growth since 1944. Methane, the chief component of natural gas, is sought for carbon black and the production of synthesis gas, the starting point in the manufacture of hydrogen, and the synthesis of ammonia, methanol, formaldehyde, and products of the Oxo process. More recently it is being used for acetylene production by Sachsse process.

Methane . . . This can be supplied to the plant by private pipeline from the producing field or by delivery from transmission lines including the long-dis-

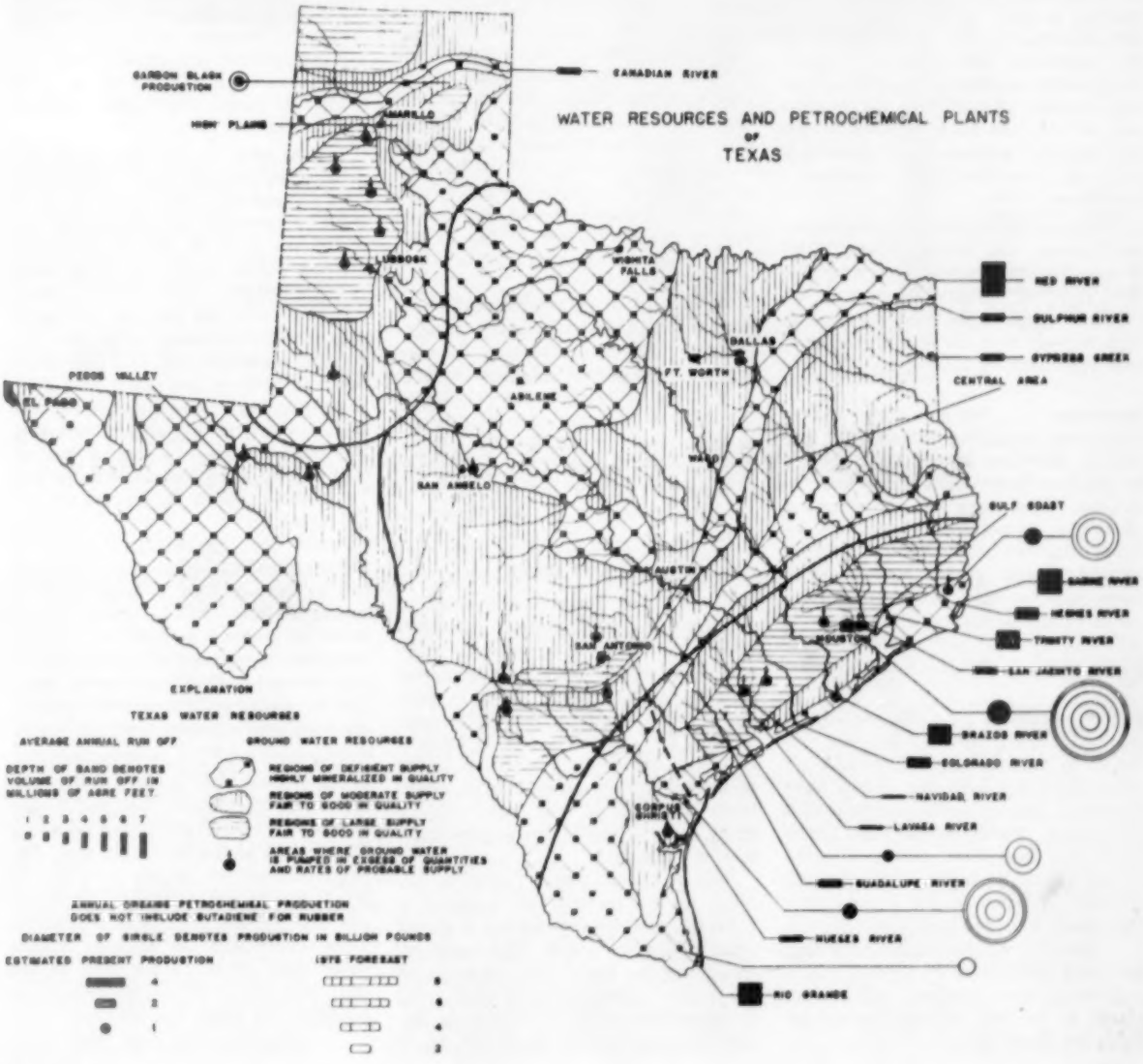
tance or transcontinental gas-transmission lines. Thus, the location of a chemical plant requiring methane as a raw material and fuel, excepting in the production of carbon black, does not necessarily have to be located close to the producing field.

The advantages in using methane over coke and other nonpetroleum raw materials have brought about a large number of conversions to natural gas as it has become available through long-distance transmission lines. Thus, such plants are planned not only along the Texas Gulf Coast, but also at points inland and in the Panhandle of Texas. Finished chemical products can now be made from methane near the principal marketing areas throughout the country, as this raw material becomes available through transcontinental pipelines.



HUMBLE'S BAYTOWN REFINERY processes paraxylene, one of the principal ingredients of Dacron.

Ethane, propane . . . A second and more



recently sought ingredient of natural gas is "enrichment gas" or gaseous mixtures containing appreciable amounts of ethane and propane. In general, chemical plants requiring such raw material are located where delivery can be made by privately owned pipeline from the gasoline plant, cycling plant, or refinery. Too, chemical plants using enrichment gas are located along the long-distance transmission lines where the ethane and heavier components are removed from the total gas stream. Such operations require the processing of much greater volumes of gas than would be encountered in field plant operations. This, combined with the extremely high price of fuel gas from pipelines, indicates that such installations will increase more rapidly near the production field.

When the chemical plant is located within reasonable distance of the source of enrichment gas, an additional advantage is seen in using one product line, transporting fuel gas as well, with the separation into desirable components at the chemical plant. Plants seeking locations primarily for the production of ethylene from enrichment gas for chemical synthesis find advantages along the Texas Gulf Coast unsurpassed elsewhere.

Plants requiring propane, propylenes, the butanes, and butenes as raw materials again find advantages near the field plant or refinery. In general, the pipeline supplies these raw materials with railway tank car and truck delivery supplementing the supply.

Aromatics . . . More recently, and to supply the increasing demands for aromatics, distillates have been employed to produce benzene, toluene, and the xylenes. This type of petrochemical plant does not necessarily have to be located close by the refinery or field natural-gasoline plant, but in many cases such locations are preferable because of the demand for the aromatic fractions by other petrochemical processing plants in the immediate vicinity.

Future expansion . . . The availability of the foregoing hydrocarbon raw materials at refineries, gasoline, and cycling plants has been one of the more important factors in the determination of present petrochemical-plant locations. To feed these plants, required in the future to supply the estimated increase in demands for basic petrochemicals, it is believed that adequate raw materials will be available through increased production in existing plants and from new gasoline and cycling plants to be built as new natural-gas fields are developed.

The concentration of such plants on the Texas Gulf Coast may be expected to develop at a more rapid rate than elsewhere because of the processing of new sources of natural gas expected from aggressive exploration and development along the coast south of Corpus Christi and offshore in the submerged tidelands.

Other raw materials required in petrochemical plant operations such as sulfur, shell, sea water, salt, etc., are found in Texas, especially along the Gulf Coast, and in the over-all analysis make the location of the plant close by the coast more favorable.

Usable Water

Usable water or potable water at present is one of the most important factors in determining plant locations in Texas. In many a petrochemical plant, water is a raw material supplying hydrogen or oxygen or both as a portion of the finished product. Likewise, it is required for evaporation and for cooling purposes. Surface and ground water are both used in chemical plant operation. Surface water, low in mineral analysis but higher in bacterial content and turbidity than ground water, is valuable when purified for boiler and steam purposes. Ground water is usually high in carbonate and bicarbonate and in many localities is high in sulfates. These waters in general are used for cooling purposes.

At present, it is potable surface or ground water which is actively sought in determining plant locations in Texas. Although sea water has become potable at the rate of 120,000 gal. per day in the Persian Gulf by triple-effect evaporation, and an economical potable water process by ion exchange methods is reported, surface and ground water remain the source of this important product.

Ground Water

Ground water may be considered as existing in underground reservoirs which can be tapped by means of wells and raised to the surface by pumping. Usually, ground water exists in sand and gravel beds and, although the total volume may be enormous, it may be locked in due to the impervious nature of the subsurface soil making its movement slow into a well bore, and in many cases is insufficient to permit extensive pumping.

This is an important factor to observe in the location of a chemical plant where much dependence is placed upon subsurface water. The water reserve may be more than adequate in the general location under study, but the movement of the water into the immediate well vicinity may not be in sufficient quantity to supply the need of the plant. In many cases, this results in excessive pumping with lowering of the pressure in the reservoir and with possible breakthrough of salt water from above or below, or the encroachment of salt water in locations where the fresh water floats on the heavier salt water.

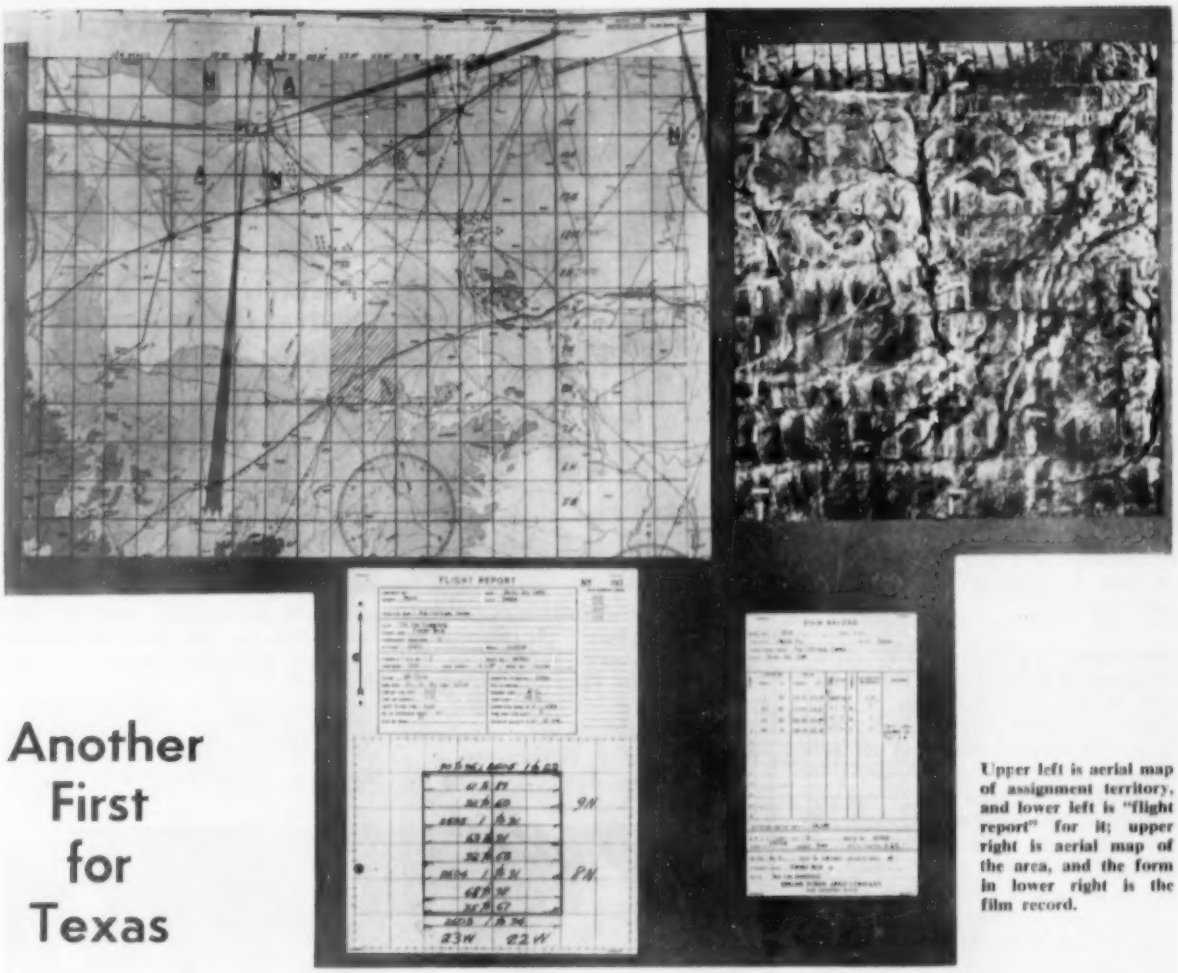
Water areas . . . The map indicates the principal ground-water areas of Texas. Consideration must be given not only to quantity but to quality as well. Noted on the map are three classifications: areas of deficient supply, and highly mineralized in quality; areas of moderate supply, fair to good quality; and areas of large supply, fair to good quality. Also noted are the areas where ground water is being pumped in quantities and at rates in excess of probable supply. At such locations, continuous study should be given to reservoir conditions by observing pressure gradients throughout the sand and by water analysis to observe the breakthrough or encroachment of salt water, or other nonusable water, which could contaminate the usable supply.

In one area in particular, along the Texas Gulf Coast, a subsurface water sand has had less than 1 per cent of its capacity removed since water was first withdrawn from it, yet a production problem exists. In this particular case, in all probability natural recharge from the water shed has replaced this withdrawal, yet there exist in the reservoir stressed conditions due to a concentration of wells in one local area with heavy pumpage. Thus, although the subsurface reservoir is full, a shortage in a given area can exist due to the inability of the sand to transport the water to the point of delivery at the desired rate.

Recharge wells . . . To offset such conditions, consideration is being given to recharge wells which would return available seasonal surface water to the water-bearing sand and bolster declining pressures. One experiment along this line is being conducted by and on the King ranch in Kleberg County.

The map gives a general graphic idea of the ground-water areas of Texas. The regions of deficient supply and highly mineralized water are found in about 40 per cent of the total state area. Regions of moderate supply with fair to good quality are found in about 45 per cent of this area. The regions of large supply with fair to good quality cover only about 15 per cent of the total area and it is in this region, as noted on the map, that there is heavy

(Continued on page 260)



Upper left is aerial map of assignment territory, and lower left is "flight report" for it; upper right is aerial map of the area, and the form in lower right is the film record.

Another First for Texas

How Those Aerial Maps Are Made

Pioneered by the late Edgar Tobin, this method of making oil-field lease and ownership maps solves problem of inaccuracies due to inaccurate surveys

THE making of maps in any state or locality has its own problems peculiar to that area. The circumstances attending the issuance of land parcels from the public domain in East and South Texas and South Louisiana were productive of a prevailing condition of conflict between the official records in the land office and the manner in which the land was actually occupied by grantees.

The early surveying of the original land grants was often sketchy and inaccurate. The original corner markers set were very often of impermanent character, and their actual locations were, more frequently than not, at variance with the description of their locations given in surveyors' field notes, which later were officially submitted and recorded.

The original grantees were also in the habit of occupying land in excess of the amount provided for in their grants and fixed by the original surveyors markers. For these reasons among others, it is impossible, practically, to construct from the official record data, with any degree of accuracy, a map of the network of original land grants as originally occupied in the regions above mentioned. The tumultuous history of Texas—once a nation all its own—contributed to the over-all confusion of this land parceling. As a result, tracing down surveys and verifying true ownership of certain parcels of land is a time-consuming, painstaking, and sometimes almost overwhelmingly difficult task.

But in spite of all the problems of the early-day settlers in parceling out the land, and the many legal maneuvers made by landowners through the years of Texas' history, one invention has held the answer to eliminating much confusion and doubt: the airplane.

The airplane, together with the modern aerial camera, is now used to "nail down" the accuracy of the true surveys of Texas' lands, and the pioneer responsible for its use was the late Edgar Tobin, who founded and established his aerial mapping firm in San Antonio.

Edgar Tobin Aerial Surveys pioneered in the making of aerial photographic maps in 1927. The firm specialized in

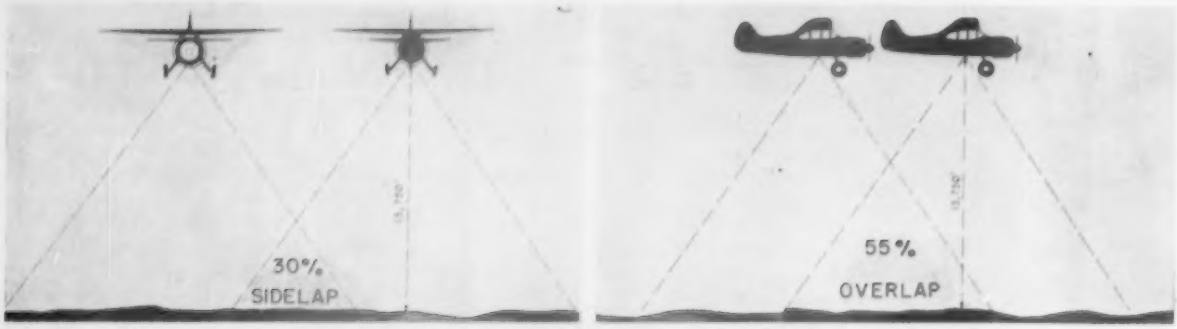


Illustration of sidelap and overlap in "shooting" of aerial photographs.

adapting this medium to the particular requirements of all divisions of the petroleum industry.

At the start, photographic maps served only one single purpose. However, today they and their derivatives have become of great value to all oil-company departments, including geological, geophysical, engineering, land and legal, and pipelining.

New maps . . . Outgrowth of earlier mapping has developed into the production of two additional types of maps which are widely used in the oil business: The regional base map for permanent recording and correlation of exploration data; and the landownership maps. This latter is for definite and accurate data concerning the complicated ownership deals, titles, abstracts, and deficiencies and boundaries.

More than 650,000 sq. miles of terrain has been photographed by the firm. Aerial-mapping coverage is based, primarily, on the conventional "Lambert polyconic projection," and for the most part is divided into mosaic units of 7½ minutes latitude and longtitude, or 65 sq. miles.

Every mosaic unit in the entire coverage, built to closest scale accuracy within itself, is also tied to the first-order triangulation net of the U. S. Coast and Geodetic Survey; to the secondary geodetic control work of the U. S. Geological Survey; and to control by other national and state agencies.

The company reports that each mosaic unit, therefore, is "correctly located with respect to the earth's surface; hence, it is in correct relative position with respect to all other units in the system."

How maps are made . . . Making the aerial maps and transposing the data from the film mosaic to actual maps is a complicated series of operations.

Very briefly, the aerial mapping is done as follows:

1. The airplane, using an aerial camera, flies over a given area to be mapped, at an altitude of 13,750 ft. above mean ground level. This gives resultant scale of approximately 1 in. equaling 1,667 ft. on the aerial pictures.

2. The view finder on the aerial camera enables the photographer to accord with the coverage area of the film exposure in the camera by means of a "collimation line" on the ground-glass, which is accurately calibrated, thus permitting him to get the required degree of exposure "overlap" in the line of flight by observing movement of the ground points between the forward edge of the camera view finder and the collimation line.

3. The pilot "flies" the area in rectangular groups of 7½' quadrangles, fitting this coverage to the boundaries of these rectangles. When through, the photographer transcribes coverage on a flight report form, the information to be used in making the mosaic.

4. Film is developed in the company plant at San Antonio, negatives being dried and processed.

5. Film is carefully indexed over light tables, the data being taken from the flight map and photographer's index card.

6. Prints used in map making are made 9 by 9 in. and are hand processed so as to have uniform density and color tone, so that compilation of many

This shows a maze of details clarified by aerial photos, and a "vacancy" is disclosed in the situation.

Aerial photo map underneath with acetate overlay above.

prints into one mosaic will have the effect of one big picture.

7. After prints are dried, trimmed, and sorted and grouped by film number, they are arranged in a "preliminary layout," where, dry and loose, prints are matched into the mosaic.

8. The mosaic is made with the contact prints to get an over-all composite picture of the area mapped. The "outlaws," prints which do not match up, are detected and rectified by adjusting the scale for proper fit.

9. Working on the mosaic, called by Tobin "engineering control," is done by numerous checks of parallels and meridians, surveys, etc.

10. After complete checking of information from various authoritative sources, all data are then transferred to acetate sheets and projected to oil-industry scales (1 in. equaling 1,000, 2,000, or 6,000 ft.)

Base maps . . . Regional base maps, made directly from and controlled by the photographs, show major land and surface detail with the same local and geodetic accuracy, and at the same time provide accurate orientation over great distances, as well as in local areas. Accuracy is assured since all information shown is traced directly from the photographic mosaics onto transparent sheets. For this reason, all land details, including cities, towns, highways, rivers, and creeks, are shown on the maps exactly as they appear on the ground.

By means of field notes and other data procured from official records, the original survey lines are plotted for the accurate base map, to be used for correlation of geological and geophysical data.

Ownership maps . . . The ownership maps produced by Tobin are made by (1) an accurate picture of the ground; (2) after exhaustive study of official records, information gathered is plotted on the picture of the ground; (3) this is traced on transparent sheets, and (4) from this transparent sheet is produced the actual map. Finished maps reflect the state of land occupancy as it actually exists on the land itself, with both local and geodetic accuracy.

Lease maps . . . An ownership print of each county being "worked" is taken into the land and lease department of each Tobin client, and a direct "take-off" made of the company's own leases only. These are returned to the map company, where lease information from all individual prints is consolidated on the master-film positive. Lessee names and expiration dates are added and a print of each county is then made from the master-film positive, and taken to the county seat, where Tobin's field men add record information affecting companies not previously checked. After all data are cleared, maps go again to the Tobin plant for final drafting on the master positive. This is then placed on file, and from it films and prints are made for sale to the customer.

Pipeline surveys . . . Aerial photographic maps are becoming standard equipment on many pipeline-construction projects. Aerial photos offer a method of planning which saves time and reduces costs, by providing reproductions at a usable scale for study of the contemplated route. There is also opportunity for stereoscopic examination of the topography.

Grid work of aerial shots starts.

Each photo is carefully "feathered" in.

Here's a long stretch of finished work.

Pilot Joe Mueller (white shirt) delivers urgently needed tool specialties to a rig in Roy Parks field near Midland. He picks up or delivers passengers or cargo right at the rig.

Oil-field men and supplies can use air taxis in hopping from rig to rig in the Permian basin. Airplanes land and take off from lease roads.

Rig Hopping by Air Taxi

. . . in Texas' Permian basin

by Tom Ashley

DRILLING activity is picking up in the Permian basin oil fields of West Texas, and it takes a lot of transportation to service some 500 rigs operating there. Air transportation is becoming more and more popular.

Author is managing editor, Flight Magazine, Dallas.

As an example, helping out on a larger scale than ever is an air taxi service now in its fourth year at Midland, which uses small, four-place airplanes to deliver passengers and cargo from rig to rig—right up to the doorstep.

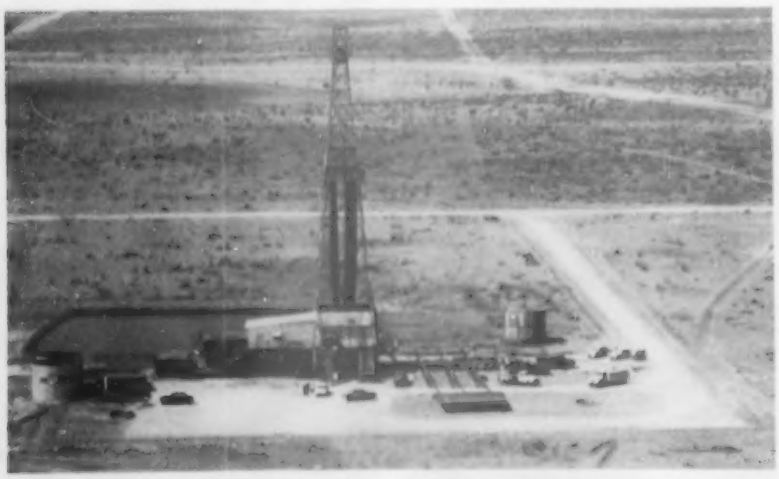
"Oil field men who use my planes want to go all the way by air—it isn't enough to land them in the nearest available field," says Joe Mueller, whose flying service is Southwest Air Rangers, based at Midland Air Terminal.

"I take them all the way, too, landing and taking off from lease roads right at the rig," Mueller says. "Public highways cannot be used by airplanes. It is not only illegal but is too dangerous to the motoring public. But company-owned lease roads are different. They do not carry public traffic and are so short I can observe even a jackrabbit before I land or take off. If this were hazardous, I wouldn't have any business."

Mueller has never had an accident in his rig hopping and his business is growing. He keeps three Piper Tri-Pacer airplanes hopping oil men to the tune of 100 hours of flying for each of the planes per month. He recently added a fourth.

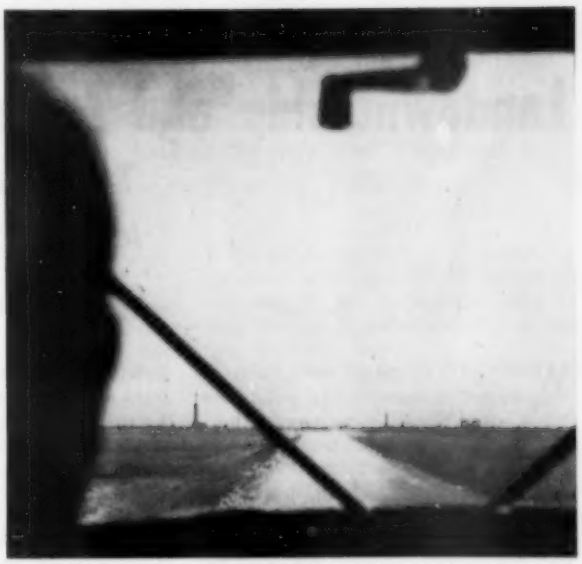
We recently flew with Mueller on his rounds of the Permian basin rigs to see how the air taxi service operated. Its door-to-door delivery service is something aviation has been trying to accomplish for years.

On our circuit, we seldom used over



Lease road shown by this deep-going rig in Pegasus field near Midland is all the "airport" oil-field air taxi requires.

From dog house, the oil field air taxi looks like this coming in for a landing right at the well (left). From inside the plane, the landing



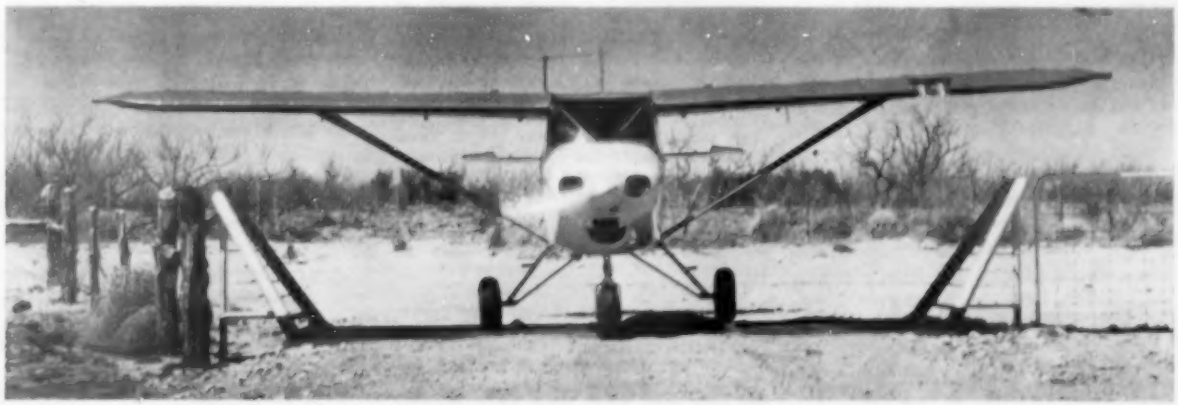
looks like this—with plenty of visibility for the pilot and passengers. Terrain in West Texas is made to order for taxi hops.

800 ft. for takeoff or landing. All lease roads were caliche, with football-size rocks no deterrent. Few were more than 15 ft. wide. On one lease, we landed and took off from a dike in a dry lake bed serving three wells. The dike was about 6 ft. high and only 12 ft. wide—our wing was twice as wide as our landing strip, which was just wide enough to carry our wheels with maybe 20 in. left on each side. Directional control on such a small strip is provided by the Tri-Pacer's nose wheel—it tracks the airplane in an absolutely straight path. Joe lands at about 65 m.p.h. and takes off at 55 or 60. He makes about 120 m.p.h. between rigs.

When not carrying oil men, his Tri-Pacers can carry as much as 600 or 700 lb. of cargo. The back seat comes out in less than a minute to provide lots of cargo space. Cargo usually consists of core samples or special tools—fishing jobs nearly always call in the airplane for fast transportation. Air taxi charges are 15 cents per mile for one or three passengers, or $16 per hour. Most round trips average about 50 or 60 miles. At the Tri-Pacer's speed this means about 15 minutes out to the rig and 15 minutes back. Ground stand-by charge is $1.75 per hour.

Several of Mueller's oil-field customers have taken to flying themselves. These bought seven new planes last year from Mueller. Others are taking flight instruction from him so they can rent his airplanes and take them wherever the job demands. These are all middle-aged men—like Garnett Plank, district field superintendent for Kewanee Oil Co. His territory is about square, 450 miles to the side. We met Plank as he returned from a field trip—in 6 hours, he had visited four sites along a 450-mile route, conducting business at each stop and having lunch at one of them. Actual flying time was only 3½ hours. By auto, Plank would have been all day and all night accomplishing the same business and travel; distances would have been greater; speeds would have been far less, and Plank would have returned home a very tired field man.

"This oil business is changing a lot," the veteran Plank told us. "Everything about it is getting to be streamlined for faster and better production work. That's why the airplane comes in so handy. It helps us get a lot more done in a lot less time. With every lease road in West Texas as a landing strip, the small plane is a natural as oil-field equipment."



Cattle guards are no obstacle to the oil-field air taxi, shown here clearing fence posts with plenty of room to spare. Wing is more than 6 ft. off the ground. Landing-gear tread is 6 ft. 7 in. Sturdy nose wheel holds plane on straight path when landing at 65 m.p.h. or taking off at 55 to 60.

Turbulent early history of state interwoven with

Landownership and Mineral Rights in Texas

There's no orderly pattern, but Texans have learned how to live with what has evolved

by Hon. Bascom Giles

WHEN Texas joined the Union by treaty, it reserved its public domain which placed it in a unique position, in that no other states were permitted to retain title to their lands when becoming a part of the United States.

Because of this situation, the United States Government does not own any land in Texas, except that which it has acquired either by outright purchase, or donation.

Texas land is a subject that has been closely interwoven with the social, economic, and political history of the state for more than 100 years. Its turbulent history is reflected in the landownership and mineral-rights pattern which has evolved through the years and up to the present time.

Texas' history, in fact, is based largely on the history of its lands. It was the allure of land which brought the pioneer families into Texas, motivated them to conquer a wilderness amid hardships and danger, and led to their advancement across the new country where many of its natural resources were discovered and later developed.

Early-Day History

Prior to 1821, Texas was practically a wilderness, where roving bands of Indians dominated the Spanish province of what is now the state. Spain's effort to build up permanent settlements in Texas was a failure.

First land grant . . . Just prior to the Mexican revolt, however, Spain began to change her land policy, and opened up the millions of acres of virgin territory for colonization. The first grant to an Anglo-American went to Moses Austin of Missouri, whose son, Stephen F. Austin, made the first settlement.

After Mexico overthrew the Spaniards, she continued the latter's policy of granting lands to Americans. Her liberal colonization laws brought immediate and widespread response, and the stream of colonists flowed in. By 1835, an estimated 30,000 people were in the various colonies.

In looking at the characteristic racial differences between these Anglo-Americans and the Mexicans, we can see that a conflict was almost inevitable. Controversial political, religious, and other views all served to fan the flame of Texas revolution.

At the start of hostilities, the Texans closed the colonial land offices and assumed control of the land problem.

Titles respected . . . When Texas separated from Mexico, it respected the valid titles to land which had been extended by Spain and Mexico, but all the vacant land within the state's borders became the property of the Republic of Texas and subject to its control. On December 19, 1836, the Texas Congress passed an act defining the territory embraced by the republic. This included all land within present boundaries, reaching out three marine leagues into the Gulf of Mexico, spread out over more than half of the present State of New Mexico, and included parts of Kansas, Colorado, and Wyoming. With acquisition of such a vast domain, estimated at 251,579,800 acres, Texas was faced with the necessity of installing a general land office and organizing a system of land management. Thus it set up such an office in 1837. Two land commissioners, John P. Borden and Thomas William Ward, managed the "Public Domain of the Republic of Texas" until February 16, 1846, the date of organization of state government.

In December 1844, John Tyler, president of the United States, recommended that a treaty of annexation be adopted by a joint resolution of Congress. This was accomplished on February 28, 1845, and provided that Texas should retain all of her public domain as well as all public debts. Texas was admitted to the Union on December 29, 1845, on an equal footing with the original states in all respects. Its state government was formally installed on February 19, 1846.

General land office formed . . . Ward was then appointed commissioner of the "General Land Office of the State of Texas," and proceeded to administer the state's land in much the same way as he handled it under the republic.

Texas continues to this day to grant original titles to its public lands, and administers them independently of the U. S. Government. A boundary dispute arose between the United States and Texas over 78,892,800 acres which Texas had previously described as being within her domain. This vast area comprised more than half of what is now New Mexico and parts of Kansas, Colorado, and Wyoming. Mexico had never recognized Texas' right to this area, and had included it in the lands which she sold under the Guadalupe-Hidalgo treaty, to the United States for $15,000,000.

After much debate, the United States paid Texas $10,000,000 for this area, and by Act of Congress February 28, 1855, the state was paid an additional $5,496,477.77, for the 78,892,800 acres. Texas was permitted to retain title to her public domain, of 172,687,000 acres —the present area.

THE AUTHOR

Hon. Bascom Giles, Texas State Land Commissioner, was born on September 21, 1900, on a farm near Austin which had been in his family's possession since 1850. He moved to Austin at the age of 12 and completed his education there. At the age of 19, he became an employe of the State General Land Office, where he remained for 17 years until his resignation in 1936. Two years later, in 1938, he was elected Land Commissioner of Texas. He is presently serving his eighth consecutive term in that office.

During Commissioner Giles' administration, Texas' permanent school fund has been increased from $56,000,000 to $260,000,000 and the university fund from $27,000,000 to $200,000,000.

Commissioner Giles participated longer than any other state official in the tidelands controversy and to him is unquestionably due a large part of the credit for the successful termination of the fight to regain for Texas the area to her historic boundaries. That victory will most surely mean additional millions to Texas' schools and school children in the years to come.

Over the years this vast area of public domain has been disposed of in a number of ways:

. . . **Land grants.** The Constitution of 1836 of the Republic of Texas recognized and honored all valid land grants which had been issued by the Spanish and Mexican governments before the closing of the first land offices, and all valid orders for surveys made before that time. Total number of acres granted by these two countries to colonists was 26,280,000 acres.

. . . **Headrights and bounties.** Numerous laws were passed by the republic giving headright grants to immigrants. For instance, under the constitution adopted in March 1836, all Anglo-Americans were given 1 league and 1 labor if they were heads of families; a single man 17 years old or more was given one-third of a league. Later laws provided heads of families should obtain 1,280 acres, and a single man 640 acres. Still later laws provided immigrants 640 acres for married men and 320 acres for single men. Total land grants, termed "First, Second, and Third Class" certificates, were given out comprising 36,876,492 acres.

. . . **Colonies.** After Texas became a republic the president of the republic signed contracts with numerous persons providing for settlement on public domain. Each head of a family got 640 acres, a single person 320 acres. Known as "Third Class Grants," the four colonies thus set up totaled 4,494,806 acres in extent.

. . . **Homestead donations (preemptions).** On January 22, 1845, an act was passed providing that all persons who settled on and improved or might thereafter settle on and improve a portion of vacant public domain not having been previously filed upon should have the right to survey and locate a tract of land not exceeding 320 acres. This law simply gave them preference right to locate on this land, and provided further that they must prove up their locations with valid certification of 3 years' occupancy.

By February 1853, the preemption or "Homestead Law" was passed providing that any person availing himself of the privileges of the January 22, 1845, act was entitled to not more than 320 acres. This did away with the necessity of covering the locations with valid certificates and was simply an outright grant of land. Other succeeding acts provided for preemption of 160 acres of land. These were carried forward in the constitution of 1876 and locations were continued until 1898.

Homesteaders simply ran out of land on which to locate homesteads, and under the preemption laws, total number of acres granted amounted to 4,847,136.

"Like the landownership pattern, the assignation of mineral rights to the land in Texas does not follow any orderly pattern, the state's mineral policy coming from . . . Spanish, English, United States, and Republic of Texas systems."

Other grants . . . The Republic of Texas was generous to its fighting men, and provided several million acres of free lands for veterans of military services. All told, 3,149,234 acres were granted in various parts of the republic to veterans and their heirs. In addition, through the years, a total of 2,990,136 acres has been sold to help pay the public debt; 7,138,640 acres set aside for internal improvements; 32,153,878 acres granted to various railroads for right-of-ways; and more than 49½ million acres set aside for educational purposes.

Mineral Policy*

Like the landownership pattern, the assignation of mineral rights to the land in Texas does not follow any orderly pattern, the state's mineral policy coming from a number of sources. These include the Spanish and English systems, the system used in the United States, and from the Texas Republic's experiments with the royalty system. Under Spain and Mexico all minerals belonged to them.

The republic acquired rights to 27,000,000 acres at the Battle of San Jacinto and for 4 years the Republic of Texas operated its domain under the Spanish civil-law system. Thus, land grants in that period were made under the same conditions, as has been pointed out previously. All minerals were the property of the republic.

However, in 1840, and little realizing the confusion they were to cause future generations, Texans adopted the English common law as the basis for interpreting property rights.

First trouble . . . The first trouble over mineral properties arose over a huge salt deposit in what is now Hidalgo County (El Sal de Ray Lake). In the early days Spanish and Mexican authorities accepted salt deposits as natural property and distributed it widely throughout Mexico.

In 1866, the constitutional convention attempted to return this salt right to the surface owners, the resolution reading to the effect that the "State of Texas hereby releases to the owner of the soil all mines and mineral substances that may be on the same, subject to such uniform rights of taxation as the legislature may impost."

Expensive legislation . . . The purpose of this convention, evidently, was merely to establish ownership of one salt deposit, but the resolution was not so worded; thus, it became the most expensive bit of legislation ever passed by any law-making body. An ultra-conservative estimate is that this one ordinance cost the State of Texas more than a billion dollars!

The first law providing for separate mineral rights was passed in 1889. According to this statute, claims of 21 acres could be located at $25 per acre, and lands containing coal, iron, oil, gas, etc., could be purchased in lots of 160 to 640 acres at $20 per acre if located within 10 miles of a railroad, and at $10 per acre if farther from a rail line.

It is obvious that framers of this statute had no idea how much mineral wealth lay under the Texas surface, for receipts from leases under this provisions totaled only $50,905.77.

Beginning in 1895, the commissioner was required to classify land at the time of its sale and could, if conditions so warranted, give to the land a dual classification stipulating that such land could be sold for agricultural and grazing purposes with the mineral rights specifically reserved to the state. This was a most important step in adjusting the land laws of Texas to meet the new emergency created by the discovery of oil.

There are approximately 7,000,000 acres of land in this category, most of which is located in West Texas.

Perhaps a more important step from the standpoint of revenue was taken by the legislature in 1939 when it dedicated to the public free school fund the mineral estate in river beds and channels and in all areas within tidewater limits including islands, lakes, and the bed of the sea, an area of some 4,500,000 acres. The tremendous potential value of this area is best expressed by the amount of bonuses received in a lease sale of the so-called "tidelands" in December of last year when the State of Texas realized over $32,000,000.

*From "Lots of Land," by Bishop and Giles, The Steck Co., Austin, Tex.

Research is performed by Southwest Research Institute on a contract basis of actual cost plus surcharge. Here is a view of the ranch near San Antonio which is the site of the institute.

Texas' S. R. I. Helps Solve Tough Problems

Unusual research group treats many phases of technology

SOUTHWEST RESEARCH INSTITUTE was founded in 1947 by Tom Slick, Texas oil man and rancher, on a portion of his Essar Ranch near San Antonio. The primary aim of this nonprofit scientific research institute is the serving of the Southwest states—Texas, New Mexico, Arizona, Arkansas, Louisiana, and Oklahoma—in their economic and industrial development. However, now in its seventh year of operation, the institute has reached a stage of national and international repute with sponsored research projects from industrial organizations, businesses and individuals throughout the United States and abroad.

The institute's staff of over 500 people, of whom some 350 are technical personnel, perform fundamental and applied research covering many fields, including petroleum technology, industrial economics, construction technology, chemistry and chemical engineering, mineralogy, mechanical engineering, oceanology and meteorology, fire technology, physics, automotive engineering, and others.

Research is performed by the institute on a contract basis of actual cost plus surcharge. In its first year of operation, its annual sponsored research budget was less than $100,000. At the end of the sixth year, this volume had increased to over $3,000,000 annually.

Petroleum technology . . . Southwest Research Institute is organized on the basis of specializing departments in which highly trained technicians work in their respective fields of specialization, such as chemistry, physics, mechanics, etc. To better present to the public the broad combined services of these strong departments, S.R.I. has organized the new scheme of broad divisions, one of which is the division of petroleum technology which maintains direct contact with various branches of the oil and gas industry. It plans and presents programs to interested companies or individuals. After an understanding is reached between the sponsor and the institute, primary responsibility for managing the project is then assigned to the department concerned with the main portion of the subject matter.

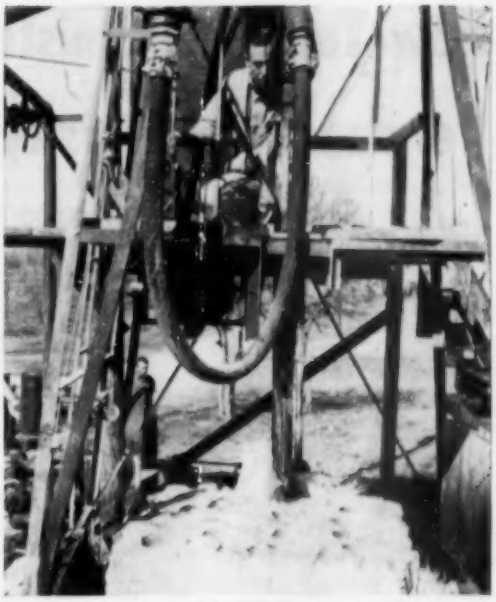
Chemistry and chemical engineering . . . This department has sections specializing in organic chemical synthesis, in water and industrial-waste problems, in various phases of oil production and oil refining and chemical products from petroleum and gas, petroleum and gas production problems, and also operates an analytical chemical service section serving this and other departments. A large outdoor area is available for pilot plant and other experimental work.

This department has found solutions to many important problems and developed some interesting new products, such as special additives for asphalt, lubricating-oil inhibitors, oil-well cements of varying density and miscible with mud, materials in several new cosmetics, a number of food products, a considerable list of new building materials and methods, a new biochemical method for disposing of industrial wastes which is many times faster than that in present use, etc.

Engines, fuels, and lubricants . . . One of the major activities of S.R.I. deals with fuels, lubricants, and internal-combustion engines. For the past 5 years the institute has operated an engine-research laboratory. Most of the projects undertaken are primarily concerned with the mutual adaptation of engines, fuels, and lubricants. Detergency characteristis of diesel-engine crankcase oils, induction-system deposition qualities of motor fuels, ignition accelerators for diesel fuels, bearing-corrosion inhibitors, combustion-chamber scavengers, and antidetonation materials are a few of the materials which are frequently studied and evaluated.

Radioactive tracer techniques have been very profitably applied to engine research, particularly in relation to engine wear. The radioactive tracer method permits very rapid determination of wear which would otherwise require many hundreds of hours of engine operation and laborious mechanical work. For example, by making one or more of the piston rings in the engine radioactive by exposure to radiation field in one of the atomic piles, piston rings can write their own wear story by virtue of the small metal particles which are worn from their surface appearing in the circulating oil stream and being detected by suitable radiation instruments. Very fortunately, this technique

Operator recording operating data of aviation gas-turbine lubricant gear test machine.



Experimental rig at S.R.I. for testing new-type tools. It has been used in development of two unique drilling tools.

can be used not only to tell the rate of wear but the location of the wear as well, since it can be extended to other parts of the engine which can be suitably irradiated for the purpose.

At the present time valve-train wear is a serious problem because of the increased power capacity of many of the new engines, and rapid quantitative analysis of antiwear characteristics of valve-train components may be made at very much less cost and more rapidly than by the conventional methods.

One of the large activities is actual road testing of petroleum products in which passenger cars become the research tool. In captive fleets, for the purpose of carrying on research, development, and evaluation of petroleum products, selected cars are driven in accordance with operating procedures selected to emphasize certain factors of interest. For instance, if a particular additive has been developed to inhibit spark-plug fouling, a vehicle is selected and a procedure is formulated which will be most likely to induce spark-plug fouling.

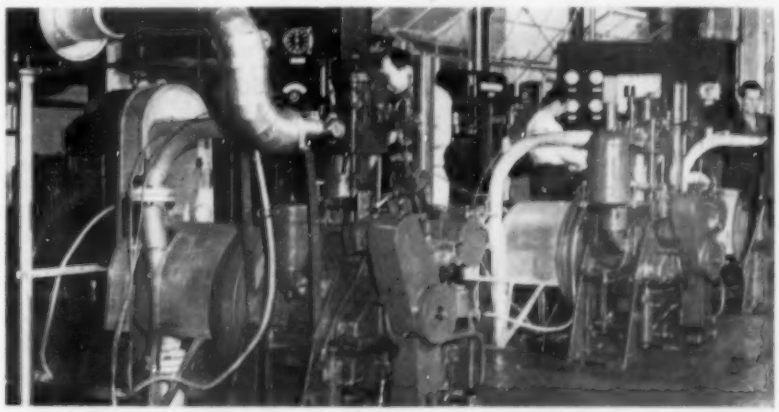
The road-testing activity in part is offered as a separate service to petroleum companies, automotive companies, and companies which make chemical additives for petroleum products as a separate yet complete service. At times the institute has had as many as 100 test vehicles which have been in use in connection with some research program on engines, fuels, lubricants, or automotive components.

Perhaps the most serious problem facing the petroleum industry is the increase in octane requirement which engines undergo as they accumulate mileage. Since the composition of the fuel and that of the lubricating oil have an important bearing on the engine's appetite for high-octane fuels, it is necessary that the factors be well understood.

Deposits which form in the combustion chamber become more critical as the compression ratio of the engine is increased. And, induction system deposits, namely, those deposits occurring in the intake manifolds and on the undersides of intake valves, may cause reduction in volumetric efficiency and engine horsepower output, or may result in engine malfunctioning by sticking valves and inducing valve burning.

Engineering physics . . . For the past 3 years several major oil companies have cooperatively sponsored an institute project designed to provide the sponsors with a scientific analysis of all new or "unorthodox" petroleum-exploration methods coming to the attention of the institute, or specifically referred to the institute by any of the sponsoring companies.

The institute has recently taken steps to assist in the formation of a corporate organization within the oil industry, the corporation to serve as sponsor for continuing analytical work directed particularly to those methods which are believed to possess sufficient scientific stature to warrant further investigations. Participation in the proposed corporation is open to all companies having an interest in petroleum exploration.



Battery of single-cylinder research engines devoted to studies of detergency characteristics of diesel-engine lubricating oils.

How Texas Administers Its Permanent University Fund

P. U. F. owns 2,100,000 acres in 19 counties; 2,413 oil wells producing 27 million barrels per year, and 56 gas wells

by Jack G. Taylor

UNIVERSITY OF TEXAS, with its 14,000 students and well-developed physical plant in Austin and its medical branch in Galveston, is the result of the foresight and determination of the forefathers of Texas in establishing the Permanent University Fund. Also receiving approximately one-third of the net income from investment of the Permanent University Fund is the Agricultural and Mechanical College of Texas, a constitutional branch but operating under its own administrative system. Added to University of Texas as statutory branches, and thus not sharing in the income from the Permanent University Fund investments, are Southwestern Medical School at Dallas; Texas Western College at El Paso; and the Dental Branch, Postgraduate School of Medicine and M. D. Anderson Hospital for Cancer Research at Houston.

The Constitution of the State of Texas prescribes "a university of the first class." By way of academic achievement, University of Texas is one of 37 members of the Association of American Universities and the only member in the Southwest.

Today the Permanent University Fund owns more than 2,100,000 acres of land located in 19 West Texas counties. A large part of the acreage is in the Permian basin geological area. These lands are all leased for grazing purposes under 10-year leases and are carried on the books of the university at $10,000,000, or approximately $5 per acre. They produce an annual revenue from grazing leases of $450,000 to $500,000.

The mineral value of the lands is not shown on the books of the university but it is considerable. As of March 1, 1954, there were 123 productive areas with 2,413 oil wells producing approximately 27,000,000 bbl. of oil per year, and 56 gas wells. To assure the future, there were 38 field wells and 21 wildcat wells being drilled. All development on the lands has been by private companies and individuals under lease from the university.

The author is endowment officer, University of Texas.

Facts About University Lands

Leases are for a primary term of 5 years and as long thereafter as there is production in paying quantities. The leases provide for one-eighth royalty and annual delay rentals of $1 per acre. Depth of producing wells on the lands range from 1,500 ft. in Taylor-Link field to 13,993 ft. in the Magutex Ellenburger area of Andrews County. Of the approximate 2,100,000 acres owned by the Permanent University Fund, 587,431 acres were under mineral lease on March 1, 1954. Of this acreage under lease, 184,598 acres or 31 per cent have been validated by production on 639 separate leases and by 101 different operators. The remaining acreage will be offered for lease in an orderly manner and to meet the needs and requests of the oil industry.

Historically, the first mineral leases from University of Texas were granted under permits. Later, the permit lease method gave way to a sealed-bid sale. Still later, the sealed-bid sale gave way to leases sold under an auction sale, the method followed today.

The auction sales are held approximately twice annually, in Austin. The tracts offered are selected from requests made by various oil companies and oil operators. The bonus lease sales are widely advertised and announcements circulated to all interested bidders well in advance of each sale. Opportunity is given for geophysical exploration on the lands prior to the sales.

Frequently the bidding for drilling blocks of approximately four sections and for regular quarter-section and half-section leases is very spirited and competition is keen. Literally thousands and even millions of dollars are committed with a flick of the wrist or a nod of the head. Probably at no other auction in the world are such high figures bid for the privilege of holding a mineral lease on an unproven tract of land, the driller's bit still being the only means of actually proving the good or bad judgment of the bidder.

Mineral leasing of the lands is under the control of the Board for Lease of University Lands composed of the state land commissioner and two members of the University of Texas board of regents. The direct management of the lands is under control of the board of regents through its endowment office. Directly in contact with oil development is the Department of University lands—Geology at Midland and Austin, and the Department of Geophysical Exploration and Oil Field Supervision at Texon. In addition, a Department of Auditing Oil and Gas Production is maintained at Austin.

Contrary to popular belief, University of Texas and A. & M. College of Texas cannot spend the moneys derived from mineral lease rentals, royalties, and bonuses offered for mineral leases. All of the moneys derived from the mineral lands are required by law to be

Summary of Auction Sales of Oil and Gas Leases on Permanent University Fund Lands

Sale No.	Sale date	Acres leased	Bonus	Av. price per acre
18	11- 2-45	42,900	$3,173,700	$73.97 + 4 wells
19	6- 7-46	16,527	3,319,500	200.84 + 2 wells
20	12-14-46	25,339	3,064,000	120.91 + 6 wells
21	12- 5-47	33,618	4,596,700	136.73 + 4 wells
22	6-18-48	41,309	5,900,800	142.84 + 9 wells
23	12-10-48	32,578	2,959,550	90.84 + 3 wells
24	5-13-49	33,090	1,508,000	45.57 + 3 wells
25	3-24-50	39,412	1,437,500	36.47 + 6 wells
26	12- 8-50	49,293	2,510,650	50.93 + 8 wells
27	6- 8-51	53,400	5,651,550	105.83 + 8 wells
28	11-23-51	59,454	7,327,500	123.24 + 12 wells
29	6- 6-52	39,438	7,805,500	197.92 + 6 wells
30	12-12-52	54,264	8,856,000	163.20 + 9 wells
31	6-19-53	73,261	16,238,000	221.64 + 16 wells
32	12-11-53	50,358	10,372,500	205.95 + 8 wells

placed in the Permanent University Fund as a permanent endowment. The fund is then invested by the board of regents through its endowment office. The table below shows the total increment to the Permanent University Fund:

PERMANENT UNIVERSITY FUND RECEIPTS FROM BEGINNING THROUGH FEBRUARY 28, 1954

	Total through Feb. 28, 1954
Oil and gas royalties	$84,537,641
Water rights and royalties	189,072
Mineral leases and misc. sources	3,033,579
Bonuses on mineral leases	106,617,130
Total through 2-28-54	$194,377,422

Growth Parallels State of Texas

The growth of the Permanent University Fund is a parallel to the growth history of the State of Texas itself. The Congress of the Republic of Texas in 1839 set aside out of the public domain 50 leagues of land to establish and endow two colleges thereafter to be created. Following by 1 year, January 26, 1840, to be exact, the Congress of the Republic of Texas passed a law which resulted in 40 acres being set aside in the city of Austin for the location of a university. This 40-acre tract is now the main part of the 210 acres composing the main campus of the university in Austin today.

In 1858, there was set aside for University of Texas 1 section of land out of every 10 sections of land surveyed and reserved for grants to railroads under the Railway Grant Act of 1854 and, further, there was set aside $100,000 in United States bonds which was part of the remuneration paid when Texas sold its Santa Fe Territory to the United States. It is interesting to note that the additional land could be granted, for when Texas became a state, by treaty it kept its public domain. From 1858 through 1881, sales from the original 50 leagues were made in varying amounts from year to year.

During the Civil War period, however, the $100,000 in United States bonds and proceeds from the land were appropriated for frontier defense against the Indians and for other expenditures so that by 1865, the cash and investments from the Permanent University Fund of nearly $285,000 had been reduced to exactly 57 cents. Undoubtedly, this sum represents an all-time low for any college endowment fund. There is little doubt that the Civil War and its aftermath delayed the actual physical establishment of the university by a great many years. Although the permanent fund for creation of a university was established in 1839, it was not until 1883 that University of Texas opened its doors for educational purposes in Austin.

The 1858 grant of 1 section for every 10 granted to the railroads was never in actual effect and was repealed by the state constitution in 1876. In lieu thereof, the constitution contained a grant to the university and its branches from the public domain of 1 million acres to constitute a Permanent University Fund. This land was surveyed in 1879 and was located in the western part of the state. In 1883, an act was approved granting another 1 million acres to the Permanent University Fund.

It may seem strange to some that such large blocks as 2 million acres of land were available for university purposes. It must be remembered, however, that the State of Texas contains about 170 million acres, and land in the early days was about the only thing of which there was an abundance. The public domain was used also for many purposes. For instance, about 3 million acres were used to pay for the present state capitol; railroad grants amounted to about 32,000,000 acres; county-school purposes took another 4 million acres; and the Public Free School Fund was granted about 42½ million acres, or nearly one-fourth of the land in the state, not including the tidelands which, likewise, belong to the Public Free School Fund. There still remain something under 1 million acres of Public Free School Fund lands which have not been sold.

A comparison of the 2,100,000 acres of Permanent University Fund lands shows that it is more than 40 times as large as the District of Columbia, 2½ times the size of Rhode Island, 1½ times the size of Delaware, and two-thirds as large as Connecticut, yet it covers only 1.16 per cent of the area of Texas.

The Story of Santa Rita

University of Texas can claim a share in the credit for the discovery of oil in West Texas. In 1917, the late Dr. J. A. Udden, then director of the bureau of economic geology at the university, first published a report pointing to the strong possibility of oil, potash, and other minerals on University Lands and in West Texas generally. How right he was. As an indirect result of the report, prospecting was begun and about May 28, 1923, the initial oil well was brought in on University Lands, this well being located in Reagan County about 75 miles southwest of San Angelo.

There is an interesting story about the name of this first well on University Lands. During the early days of its financing, the promoters, Rupert Ricker, Frank T. Pickrell, and Haymon Krupp, interested a group of New York Catholics in the Texas project. They sought the advice of a priest and he admonished them that if they invested, to implore the aid of Santa Rita, saint of the impossible. Before Pickrell left New York, two of the women gave him a sealed envelope containing a red rose. They requested him to climb to the top of the derrick, take the rose from the envelope, crumble it in his hands and sprinkle the dried petals over the structure. As they drifted down over it, he was to say, according to instructions, "I christen thee Santa Rita." It seems to be rather definitely established that Pickrell carried through this rite, hence the name Santa Rita.

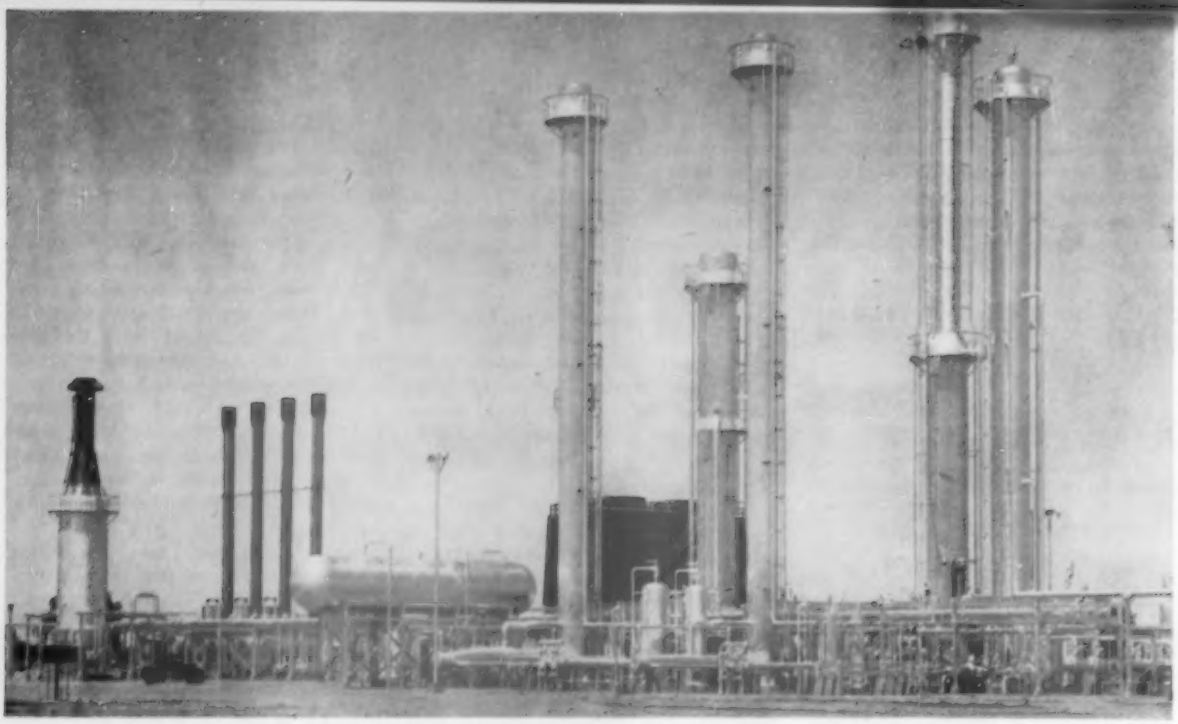
There are likewise many interesting stories, perhaps true, perhaps not true, about the location of this first well. One story is that the equipment which was being hauled to the location on a truck was stopped in a breakdown of the truck; and since the time was short and drilling had to be done immediately, a drill was set up where the truck broke down.

Another is to the effect that a severe and protracted rainstorm, something very rare in that part of the country, overtook the teams and men as they were hauling the equipment to the place and that the ground became so soft that the wagons bogged down and that the teams couldn't haul it further; and, although the rain was pouring down in perfect cloudburst, the machinery was unloaded and set up and the well spudded in just a few minutes before midnight of the last day of grace. The facts certainly are that the first drilling was begun on this last day within a few hours of the time when the lease would have expired had a well not been begun.

It is also rather certain that the well which was begun to save the lease and was called an oil well was in fact a water well and was intended from the beginning as a water well. Water had to be available in considerable quantity before an oil well could be drilled.

In any event, the Santa Rita, the discovery well, was in the very extreme western edge of the pool in Big Lake field. All subsequent discoveries in that field have been east of the discovery well. Thus began oil development on University Lands. Records now show that the cumulative oil production from all University Lands in West Texas as of November 1, 1953, was 392,234,109 bbl.

University of Texas is proud and appreciative of the Permanent University Fund and its land endowment, its history, and its record of development which has well exceeded all original expectations.

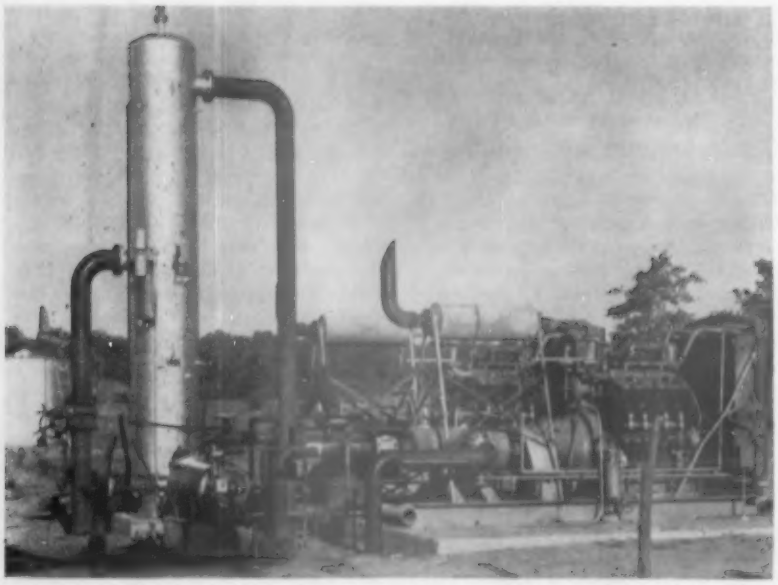


BOWIE GASOLINE PLANT in Montague County, North Texas, which is of the conventional absorption type.

DRAWING BOARD TO ON STREAM—6 MONTHS

New Texas Plant Unusual on Four Counts...

• 125-Mile Gathering System • Small Unattended Field Compressors • Uses Steam Power • Adaptation to Radio Monitoring



This outlying field booster station of Bowie gasoline plant utilizes centrifugal compressors.

THE Bowie gasoline plant, one of the most unusual gasoline plants to go on stream in recent years, was completed and placed in operation in less than 6 months from the beginning of process design.

The plant is located in the west-central portion of Montague County, North Texas, and was designed and constructed for Bowie Gasoline Co., Dallas, by Hudson Engineering Corp.

Operation of this plant is unusual in that it:

- Picks up small quantities of gas from widely scattered points in the county through a 125-mile-plus gathering system.
- Uses small, unattended field compressors.
- Employs steam power almost exclusively.
- Contemplates using a radio monitoring system in the operation of the field compressors.

In order to provide sufficient gas to

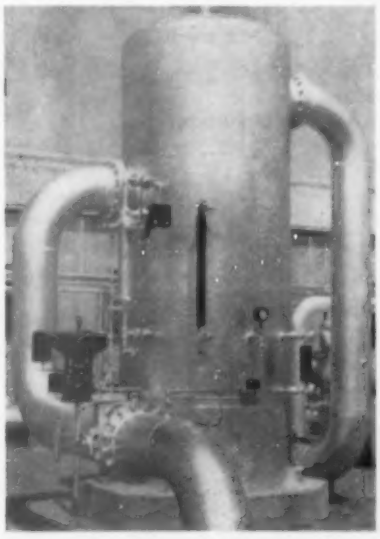
economically justify an absorption-type gasoline plant in the Bowie area, relatively small quantities of gas had to be gathered from scattered points and piped to a central location.

Field compressors were installed to boost the gas from these central points to the plant. This permitted reducing substantially the size of pipe required for the gathering system. It also eliminated the necessity for maintaining field personnel to check and drain periodically the large number of drips which would have had to be incorporated in a low-pressure gathering system due to the uneven contour of the terrain in the area.

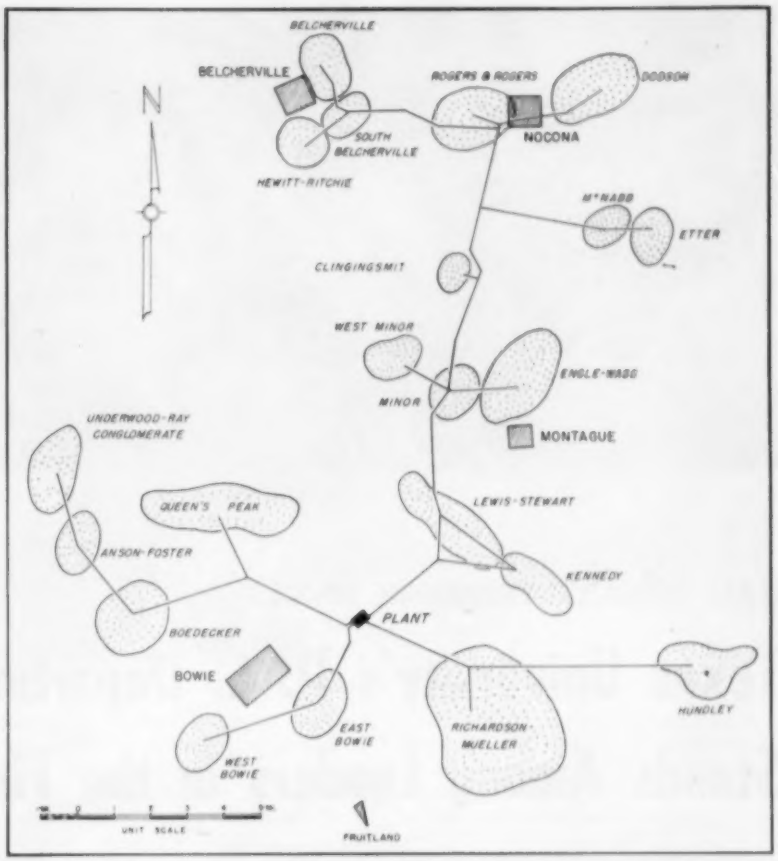
Gas - engine - driven rotary compressors were selected for the field compression service. These units offered the advantages of low initial cost and a minimum of maintenance. A total of 15 compressors, each having a capacity of 1,500,000 standard cubic feet per 24 hours, were installed in nine separate stations, and each driver-compressor is a completely independent, skid-mounted, portable unit. Each station has from one to three compressors operating in parallel.

The use of several small units rather than one larger unit allows standardization of equipment and provides flexibility of operation over many years of changing conditions. When increase or decrease in production from an area changes the quantity of gas, compressor units can be relocated to meet these changes.

Compressors take suction at 0 to 5 psig. and discharge the gas into the transmission system at 45 psig. Each unit is speed controlled to maintain a set suction pressure and has a capacity from 900,000 to 1,500,000 standard cubic feet per day, depending on the speed. Cooling capacity for the compressor jacket is provided in the engine radiator so that no outside source of water is required.



Scrubber installation, Bowie gasoline plant.



Gathering system of Bowie Gasoline Co. in Montague County, Texas.

The pipeline gathering system for the plant is one of the most extensive gasoline-plant systems anywhere, comprising between 125 and 150 miles of 2-in. through 14-in. It is divided actually into two systems—the Nocona and Bowie systems.

The former is comprised for the most part of the gathering system formerly owned by Highlander Gasoline Co., Nocona, Tex., and purchased by Bowie, together with the old Highlander plant, in September 1953. Bowie laid a 4-in. residue-gas line from Bowie plant to Nocona to supply City Gas Co. of Nocona and other residue obligations of Highlander.

The old plant was shut down and the pipeline system tied in with the new lines and extended. It now serves Minor, West Minor, Engle-Wagg, McNabb, Rogers & Rogers, Dodson, Belcherville, and Ritchie fields.

The other system, the Bowie system, is completely new and is now picking up gas from 10 fields including: Hundley, Richardson-Mueller, East Bowie, West Bowie, Boedecker, Anson-Foster, Underwood-Ray conglomerate, Queen's Peak, Lewis-Stewart, and Kennedy.

Bowie currently is making plans to extend the systems even further.

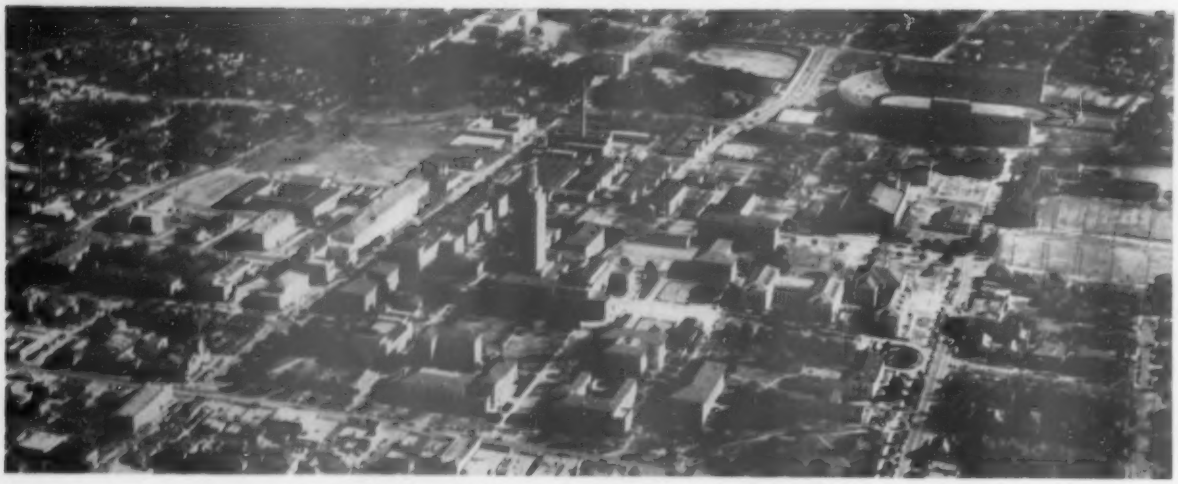
Radio monitoring . . . The plant is making extensive use of short-wave radio facilities. A base station located at the plant is used to contact mobile units which cruise the wide area covered by the gathering system conducting a continuous check of operations of compressors and pipelines.

Bowie has plans for installing a monitoring system which would automatically notify the plant of the failure or breakdown of a compressor unit at any of the eight field stations. If the plans are carried out, it is believed this would be the first application of such a monitoring system at a gasoline plant.

Gasoline Plant

The gasoline plant is of the conventional absorption type. The inlet gas passes through a scrubber where con-

(Continued on page 261)



Aerial view of the campus of University of Texas at Austin.

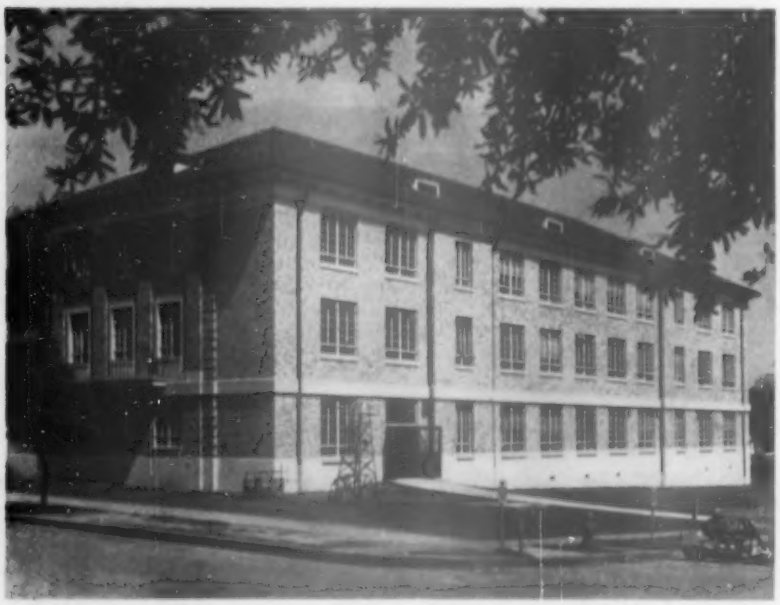
TEXAS PETROLEUM ENGINEERING SCHOOLS

Texas University's P. E. Department Stands Among Leaders in the Field

ONE of the outstanding institutions of its kind in the United States is University of Texas' petroleum-engineering department. The department, unofficially founded in 1928 when Dr. E. H. Sellards of the university's bureau of economic geology held the first classes, has turned out hundreds of petroleum engineers who have taken over important tasks within the petroleum industry.

The beginning of the department was a humble one, but it has steadily grown until today, after 25 years' time, it stands among the leaders in the field in producing trained petroleum engineers.

Several universities and colleges in Texas present work in petroleum engineering. Here, and on following pages, are brief accounts of the courses available, and degrees offered at these institutions.



Three-story engineering building at University of Texas. The structure has a floor space of 33,000 sq. ft.

History . . . Although the official formation of the petroleum-engineering department did not occur until 1930, the effort dates back to 1928. It was in that year that Dr. Sellards organized the first class in petroleum engineering at the university in Austin. Four classes were taught the first year by Dr. Sellards, and another was headed by Dr. E. P. Schoch.

A year later, in 1929, when the formal curriculum was adopted to include graduate as well as undergraduate work, courses were offered by Prof. F. B. Plummer, of the bureau of economic geology; Dr. L. S. Brown, of the department of physics, and Doctors Sellards and Schoch. The department was officially formed in 1930 with Professor Plummer the first chairman.

The first class, graduating in 1931,

consisted of two students; the next year three men were graduated.

The first master of science degree was received by R. B. Newcome, who also served as an instructor from 1933-35. E. C. Sargent served as instructor from 1935-36, and Dr. R. T. Hill was appointed honorary lecturer, serving in this position until his death in 1941.

Able staff . . . Following natural growth, other noted engineers became associated with the department. George H. Fancher, who formerly taught at Pennsylvania State College and Colorado School of Mines, was appointed professor in 1935. Professor Fancher is presently director of the Texas Petroleum Research Committee of the university. (A separate article on the committee's functions appears elsewhere in this issue.)

In 1936, Harry H. Power, then chief production engineer for Gulf Oil Corp. at Tulsa, was named professor and chairman of the department. In that same year Robert E. Hardwick was appointed the honorary lecturer.

Staff members since 1936 have included: W. J. Murray, Jr., now a member of the Texas Railroad Commission, the regulatory body administering rules and regulations pertaining to conservation in the petroleum industry; George McCoy; J. I. Laudermilk; R. L. Whiting; G. L. Corrigan; E. E. Sweeney; Charles Weinaug; LeRoy Puls; Charles B. Peterson; Wallace W. Wilson; Lake Robertson; Charles W. Larkham; J. R. Spencer; Paul Roston, and Howard Bradley.

Elred W. Hough joined the department staff as a full professor in 1952, coming to the university from his post in the research department of Stanolind Oil & Gas Co. in Tulsa. Frank W. Jessen joined the staff as a visiting professor in 1952; he was previously with Humble Oil & Refining Co. and Petroleos Mexicanos (Pemex), the Mexican oil agency.

Curriculum changes . . . A number of changes have been made in the department's curriculum during the past years. The so-called "descriptive technologic" types of courses have been replaced with those employing the engineering, or "quantitative approach," and material has been developed which is distinct from other fields, and characteristics of petroleum engineering alone.

More specialized subjects which apply fundamentally to the basic principles presented in undergraduate work to production and development problems have been accomplished through a division in education. Important research work has been completed on a number of phases of drilling and production activities, including: drilling fluids, salt-water disposal, stimulation of oil recovery by acidizing, condensate-gas production, motor fuels and gasoline, the heaving-shale problem, secondary-recovery problems, and the problems encountered in reservoir engineering and applied chemistry.

Student at work in one of the laboratories.

The university points out that integration with other supporting departments has been accomplished more effectively during the past few years. In particular are those offering courses in geology, chemistry, physics, mathematics, and other engineering branches.

Facilities . . . Laboratory facilities for study of such diverse fields as properties of reservoir rocks; drilling muds; reservoir fluids (brine, oil, and gas), including phase relationships, compositions, and surface chemistry; corrosion; cements, and hydration of clays are provided for the engineering student.

The modern, well-equipped departmental building has 30,000 sq. ft. of floor space, of which 4,100 sq. ft. is devoted to class rooms, 7,000 sq. ft. to undergraduate laboratories, 1,800 sq. ft. to shop, including stock room and facilities, and 4,400 sq. ft. to laboratories in which graduate research can be prosecuted.

A nucleus of laboratory equipment and service personnel is available for purposes of advanced research. As an example, a stock room is provided containing such items as a White double potentiometer, a fluid-pressure balance, a high-pressure viscosimeter, a number of volumetric cells for use at high pressure, microscopes, tensiometers, an oscilloscope, and other special equipment. An advanced machine shop is also provided, as are a full-time laboratory-services supervisor and machinist.

Today's curriculum . . . Following the many modifications brought about through necessity in advancement of petroleum technology within the petroleum industry, the department has designed its present-day curriculum to give fundamental training in application of mathematics, physics, chemistry, geology, general engineering, and economics, to development problems, and to production, transportation, measurement, and storage of oil, natural gas, and natural gasoline.

The present curriculum calls for a 4-year course and one summer leading to a bachelor of science degree in petroleum engineering. An additional year of postgraduate study leads to a master of science degree, and opportunities are also afforded in advance studies and research to suit individual student requirements.

Combined degrees in petroleum engineering and some other branch of engineering or geology may be obtained in about 10 semesters, and students are encouraged to find employment during one or more summers with an oil or gas company.

Present status . . . During the 1952-53 school year, 346 undergraduate students were enrolled in University of Texas' petroleum-engineering school. Eight graduate students were enrolled.

PETROLEUM ENGINEERING BUILDING at Texas A. & M., College Station, Tex.

TEXAS PETROLEUM ENGINEERING SCHOOLS

A. & M. One of Largest, With Nearly 400 Students

ONE of the nation's largest and best-known petroleum - engineering departments is that of the Agricultural and Mechanical College of Texas, located at College Station. Present enrollment is 382 undergraduate and 10 graduate students.

As of January 1, 1954, Texas A. & M. has granted 983 B.S. and 14 graduate degrees in petroleum engineering.

The department at A. & M. College was started in September 1929, offering work leading to a degree in petroleum production engineering. The first class was graduated in 1931. In 1936, the title was changed to petroleum engineering. In 1937, work towards the masters and Ph.D. degrees was initiated. The first master's degree was granted in 1941, and the first Ph.D. degree in 1953.

Six individual courses in petroleum engineering are available to the students in this department:

- A regular 4-year curriculum in petroleum engineering, which leads to a degree of bachelor of science. This curriculum includes sufficient training in civil, mechanical, and electrical engineering to prepare the graduate for the application of engineering principles to the petroleum industry. Courses in geology give an understanding of the geological structures and conditions favorable for petroleum deposits.
- A 5-year curriculum in petroleum engineering, which leads to a degree of bachelor of petroleum engineering. The extra year is designed to provide a broader educational background and this curriculum contains all the courses included in the 4-year curriculum and courses in psychology, accounting, English, economics, business, geography, and advanced mathematics.
- A 5-year curriculum in petroleum engineering - general business, which leads to a bachelor of science degree in petroleum engineering and the degree of bachelor of business administration.
- A 5-year curriculum in petroleum engineering - chemical engineering, which leads to a bachelor of science degree in both petroleum engineering and chemical engineering.
- A 5-year curriculum in petroleum engineering - geological engineering, which leads to a bachelor of science degree in both petroleum engineering and geological engineering.
- A 5-year curriculum in petroleum engineering - mechanical engineering, which leads to a bachelor of science degree in both petroleum engineering and mechanical engineering.

Graduate level . . . Graduate work in petroleum engineering is offered on

A. B. STEVENS | J. R. PEDIGO | J. W. AMYX | H. T. KENNEDY | R. L. WHITING

ARE YOU *Klingerwise?*

USE *Klinger*

SHEET PACKINGS

"KLINGERIT"
Universal compressed asbestos sheet packing for all purposes

"KLINGERIT 1000"
Wire-reinforced compressed asbestos sheet packing for all uses

"KLINGER—ACIDIT"
The finest acid resisting compressed asbestos sheet packing

"KLINGER—OILIT"
Especially made for use with oils and with most hydrocarbons

RAK
A good quality sheet packing for general engineering practice

Write for the Klinger Master Catalog which describes the complete range of Klinger products, compressed asbestos sheet packings for all purposes, valves, cocks, level gages, synthetic and silicone rubbers.

FIRST IN 1886 FOREMOST TODAY

RICHARD KLINGER LIMITED, KLINGERIT WORKS, SIDCUP, KENT, ENGLAND

Agents throughout the World

Manufacturing Licensees for Canada

JOSEPH ROBB & COMPANY, LIMITED
5575, COTE ST. PAUL ROAD, MONTREAL, 20, CANADA
Telephone: WILBANK 3181 Cable: ROBCO
Branches at: SYDNEY, N.S., HALIFAX, N.S., OTTAWA, Ont., TORONTO, Ont., HAMILTON, Ont., WINNIPEG, Man., EDMONTON, Alta., VANCOUVER, B.C.

Manufacturing Licensees for U.S.A.

THE KLINGER CORPORATION OF AMERICA
95, RIVER STREET, HOBOKEN, NEW JERSEY, U.S.A.
Telephone: HOBOKEN 2-7915 Cable: KLINGDALE
New York NEW YORK U.S.A.
Telephone: WHITEHALL 3-8996

both the master's and doctorate levels. On the master's level, courses are offered with the primary aim of giving the student a fundamental understanding of the performance of petroleum reservoirs, and their behavior under conditions imposed by pressure depletion, pressure maintenance, secondary-recovery operations, and cycling.

On the doctorate level, curricula are offered to give the student a broad understanding of the various phases of the petroleum industry as well as the ability to investigate and solve technical problems arising in the industry by original research. Laboratory facilities are available for advanced studies on all phases of reservoir equilibrium and mechanics, including equipment for work on permeability-saturation relationships, core analysis and interpretation, secondary recovery, and model reservoir studies.

The present staff in Texas A. & M.'s petroleum engineering department consists of Albert B. Stevens, M.S., professor and head of department; H. T. Kennedy, Ph.D., distinguished professor; Robert Whiting, M.S., professor; John R. Pedigo, B.S., associate professor; J. W. Amyx, B.S., assistant professor.

TEXAS PETROLEUM ENGINEERING SCHOOLS

University of Houston Offers Both Undergraduate and Graduate Work

UNIVERSITY OF HOUSTON is fortunately in a position to render a maximum service to the petroleum industry. In the departments of petroleum engineering and chemical engineering both undergraduate and graduate degrees are now offered. Approximately 80 per cent of the students work part time in the industry.

Many of the advanced students work full time and attend school in the evenings. Industry thereby helps the school in that it offers part-time employment to individuals who would otherwise be unable to attend. The school, in turn, offers advanced courses for the benefit of full-time industry personnel. Special courses are offered at the advanced level in both departments, which are particularly suited for the demands of industry.

The increased emphasis on reservoir engineering in the past few years has resulted in a demand for a more intensified instruction in Texas and Southwest area. Accordingly, courses dealing primarily with the physical principles of oil and gas reservoirs have been instituted. The emphasis on reservoir fundamentals has further led to a demand for a course in which the physical, legal, and economic factors involved in the production and development of oil and gas fields are integrated. A course covering this subject matter is now also being offered.

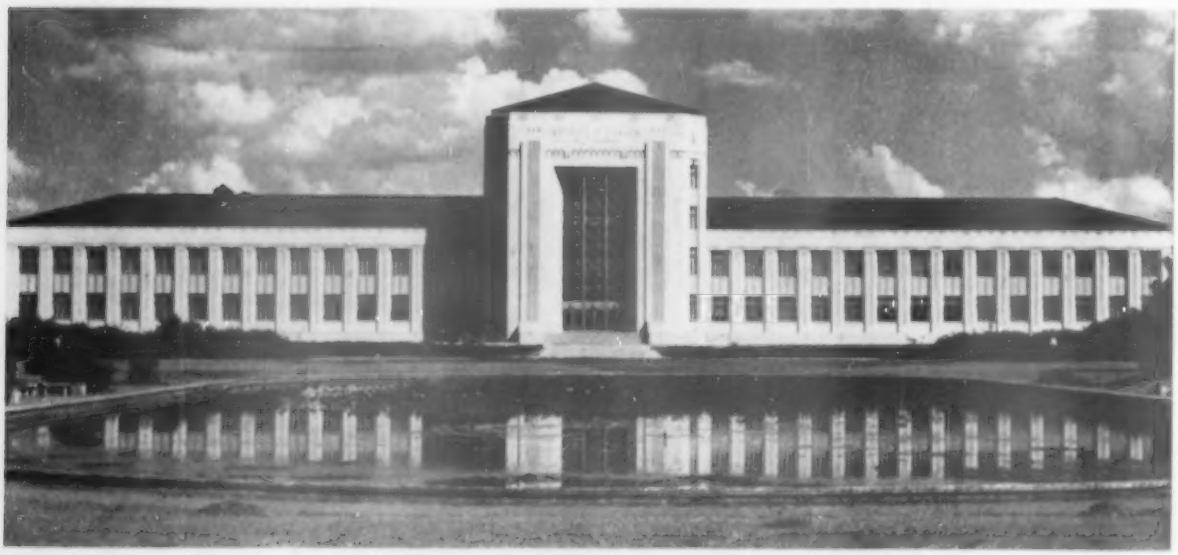
The rapid rise in the cost of drilling wells in recent years has resulted in a greater emphasis being placed on formation evaluation techniques. This demand is being met by a course dealing with log interpretation, formation-testing techniques, and well-completion practices.

The department of chemical engineering has instituted a very popular course in corrosion. This course essentially covers basic electrochemical fundamentals, cathodic protection, oil and gas-well corrosion, and corrosion problems of chemical and refinery plants.

Special research problems are currently conducted by petroleum-engineering graduate students in the field of mobility ratios, electric-logging principles, gas lift, and compaction-pressure studies.

The instructional staff of both departments is made up of individuals who have had many years' experience with industry problems as well as experience in teaching at the university level.

A $250,000 engineering building is to be constructed during the summer of 1954. Improvement of existing laboratory facilities will also be undertaken this summer. This will allow the rapidly extending graduate programs in the fields of petroleum and chemical engineering to be more adequately handled.



ADMINISTRATION BUILDING of University of Houston.

The three members of Texas Tech's petroleum engineering faculty are shown in the faculty club. W. L. Ducker, right, professor and head of the department, and Philip Johnson, left, and Norman Lamont, center, both assistant professors, were wrested from industry to do the teaching in petroleum science at Tech.

TEXAS PETROLEUM ENGINEERING SCHOOLS

Three Options at Texas Tech

THREE options are open to the petroleum-engineering student at Texas Technological College at Lubbock: (1) a production option, (2) a natural-gas option, or (3) a combination option with mechanical engineering. Each contains special courses that are aimed at preparing the student for the problems he will actually encounter when he enters the oil industry.

Besides this, the college offers two basic plans for the petroleum-engineering student, (1) a 4-year course leading to the degree of bachelor of science; (2) a 5-year course leading to a bachelor of science in petroleum engineering plus a separate bachelor of arts degree.

Regardless of whether the student is enrolled in the 4-year or the 5-year plan, his advanced courses follow the same general outline. The production option deals with the application of well-logging theory and methods, drilling problems, and advanced production and reservoir problems. The natural-gas option deals with phase behavior of hydrocarbons and problems in production, transmission, and testing of natural gas and gasoline. In the longer course, however, problems are approached from a slightly different level made possible by the additional work done in the arts and sciences division.

Petroleum-engineering students are encouraged to find jobs in the oil fields during the summer months to add practical experience to their college training. These jobs also aid the student in deciding upon his option.

Two student organizations help the aspiring engineer to broaden his outlook and knowledge of the oil industry —the American Institute of Mining and Metallurgical Engineers (Student Branch) which works closely with the professional branch in Lubbock; and Pi Epsilon Tau, national honorary petroleum - engineering fraternity which meets monthly. Prominent oil men are speakers.

Texas Tech's P.E. Building

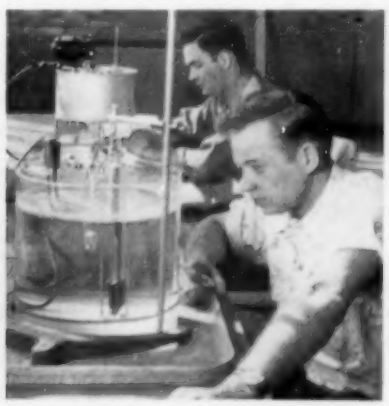
The petroleum - engineering department is housed in its own building which has classrooms; laboratories for testing drilling fluids, for analyzing and testing natural gas and for the study of problems related to the oil industry, plus accommodations for a teaching staff of three. Prof. W. L. Ducker now heads the department. On his staff are Norman Lamont and Philip Johnson, assistant professors.

The Petroleum Engineering Building is one of five engineering buildings at Tech. Thirty-six permanent-type buildings dot a 300-acre section of the campus. The rest of the large campus includes 1,500 acres in irrigated farms and 6,000 acres of choice experimental farms. A $545,000 Student Union Building, and expansion of Jones Stadium to give it a 30,000 seating capacity were completed recently under a current building program. Work now is under way on a $1,750,000 coliseum-auditorium which the city of Lubbock is erecting on the north end of the main campus. This will have a seating capacity of 10,000 and will be available for college events.

Texas Tech's academic program is divided into five undergraduate divisions and the graduate school. Divisions include agriculture, arts and sciences, business administration, engineering, and home economics. The college has a faculty of 285, exclusive of teaching fellows. September 1953, enrollment was 5,398.

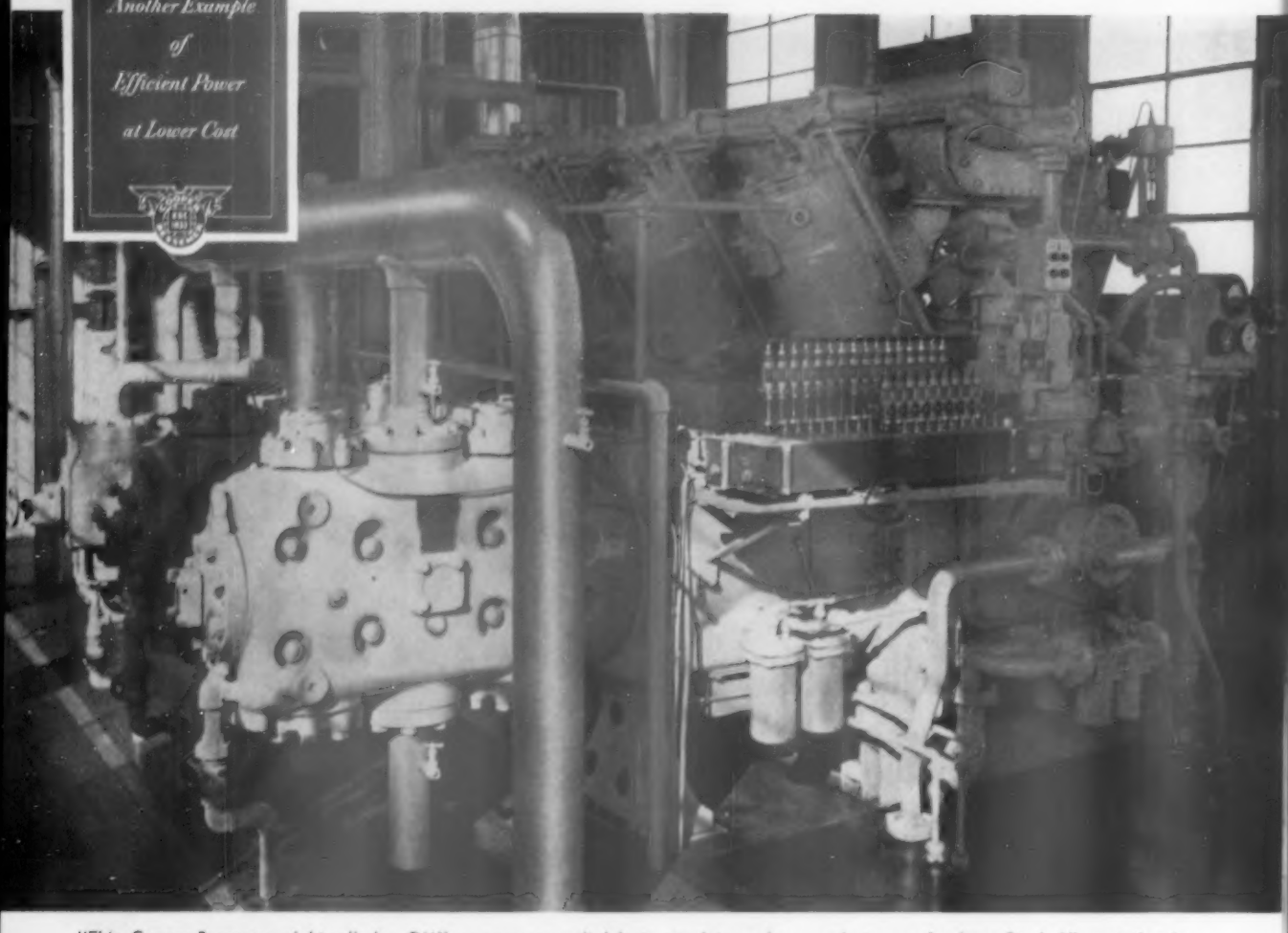
Texas Technological College is a growing college which has reached a high stage of development in its offering for undergraduates, and now is ready to develop an effective program of research and of higher education in the graduate school.

Work in the production course of the petroleum engineering department includes a test for determining the permeability of cores.



With instruments checked for accuracy by the U. S. Bureau of Standards students determine the viscosity of crude oil.

Another Example of Efficient Power at Lower Cost



"This Cooper-Bessemer eight-cylinder GMX compressor unit injects gas into underground storage for Lone Star's View station in West Texas. Dependable GMX's are available from 220 to 500 bhp."

IN WEST TEXAS... GMX means "Gas Assurance"

For the last eight months, an 8-cylinder Cooper-Bessemer GMX compressor has been efficiently injecting natural gas into underground storage at Lone Star's new compressor station in the View Field, near Abilene, Texas.

At the maximum rate of 6 million cubic feet daily, nearly one billion cubic feet of reserve gas is now stored here to meet peak consumption demands in the West Texas area.

The advanced features of the compact 440 hp GMX gas engine-driven compressor make it a natural for use in this kind of service. For example, you gain unusually low space-to-power ratio . . . exceptional fuel and lube economy . . . and flexible response to automatic control that permits unattended operation.

As with all Cooper-Bessemer units, *proven* design features contribute to the dependability and lower operating cost of the long-lived GMX. Make it a point to learn more about Cooper-Bessemers! Your nearest representative will be glad to give you complete details.

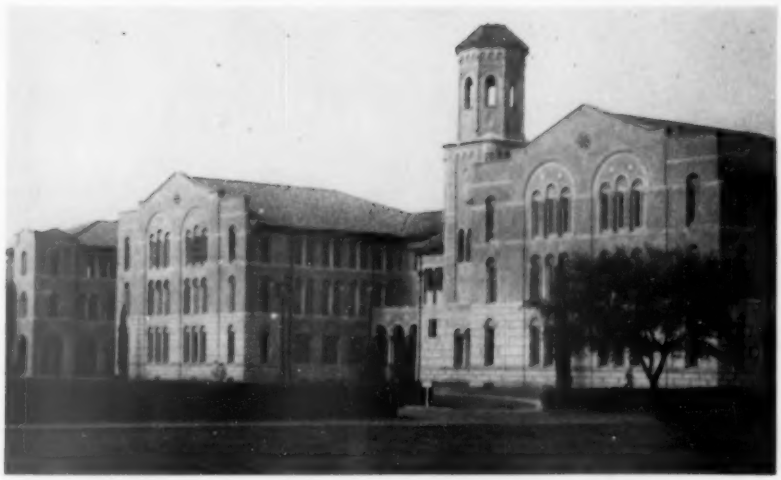
MOUNT VERNON, OHIO

COOPER-BESSEMER

GROVE CITY, PENNA.

New York City • Seattle, Wash. • Bradford, Pa. • Chicago, Ill. Houston, Dallas, Greggton, Pampa and Odessa, Texas Washington, D. C. • Shreveport, La. • San Francisco, Los Angeles, Calif. • St. Louis, Mo. • Gloucester, Mass. • New Orleans, La. • Tulsa, Okla. • Cooper-Bessemer of Canada Ltd., Edmonton, Alberta—Halifax, Nova Scotia.

DIESELS • GAS ENGINES • GAS-DIESELS • ENGINE-DRIVEN AND MOTOR-DRIVEN COMPRESSORS



CHEMISTRY BUILDING at Rice is a Texas citadel of fundamental research.

TEXAS PETROLEUM ENGINEERING SCHOOLS

Rice Pursues Broad Program

RICE INSTITUTE, located in Houston, in the heart of the petroleum industry, contributes to this industry by general education of students and the promotion of fundamental research.

A large number of Rice graduates find their way into the oil industry, not only the engineers and scientists with their academic and professional degrees, but also the graduates in liberal arts. About half of Rice's graduates have received degrees in the liberal arts, and many of these, from lawyer to economist to general business executive, are following careers in the petroleum industry.

Rice recognizes the desirability of having all students pursue a broad program of fundamental sciences and humanities, rather than a narrow course of specialization. To this end, the institution has offered a 5-year program in engineering and architecture since 1947, awarding a bachelor of arts degree at the end of 4 years and a bachelor of science degree on the successful completion of 5 years of study. All engineering and architecture degrees at Rice are professional rather than vocational.

The Harry Carothers Wiess chair of geology was established by a gift to the institute by Olga Keith Wiess as a memorial to her husband, Harry Carothers Wiess, formerly chairman of the board of Humble Oil & Refining Co. and influential member of the board of trustees of both Princeton and Rice.

The Rice Institute board of governors has selected Dr. Carey Croneis, formerly president of Beloit College, as the Harry Carothers Wiess professor of geology and under his guidance classes in geology are meeting for the first time this semester.

In carrying out the expressed desire of Mrs. Wiess, the department of geology has been designed to be unique not only in North America but in the world. In common with the rest of the institute it is organized on the basis of quality, not the quantity, of the staff, the students, the research studies, and the curricular offerings. The department specializes in fundamental research and graduate instruction rather than in routine investigations and service courses.

Research

Presently the laboratories of the institute have many programs of basic research underway which deal with the problems of the petroleum industry: Among others:

Chemistry . . . Fundamental research, as contrasted to development, is emphasized in several lines of scientific investigations in chemistry, which are of both direct and indirect interest to the petroleum industry. The synthesis of numerous types of organic compounds, related to petroleum chemistry, is followed by investigations of structure, kinetics, and heats of reaction. Facilities are available for precise low-temperature calorimetric measurements. Studies of the molecular structure of both organic and inorganic compounds are carried out, using modern single crystal and powder X-ray and electron diffraction methods.

Mechanical engineering . . . These laboratories have three research studies under way which deal directly with the petroleum industry:

1. Analysis of the damping of wind induced vibrations of bubble towers brought about when the trays of the tower are filled with fluid. Tests have been conducted on a scale model.

2. Two-phase investigation of shrink fits is under way. The first phase is the measurement of friction coefficients while the second is an analysis of stress concentrations. The results may eventually aid in the design of tool joints.

3. A model has been designed and an experimental study of drill-column vibrations is in progress.

Chemical engineering . . . Measurements are being made on the densities and phase equilibria of hydrocarbon mixtures at pressures up to 25,000 psi. and temperatures from −325° to 460° F. Such fundamental studies not only provide a basis for the evaluation of petroleum resevoirs, but also permit design of plants and equipment for separation of crude into its component parts.

Another active research project is concerned with the reactions of the light hydrocarbons with oxygen. Such studies form a basis for many of the important syntheses in the petrochemical industry.

A third study in chemical engineering deals with the behavior of hydrocarbons in the critical and "near critical" state. By making precise measurements of fundamental physical properties near the critical, it is hoped that a greater insight can be gained of the critical phenomena.

Economics . . . This department has recently completed a study of the capital structure of the petroleum industry. During the course of this investigation initial investment cost studies were carried out for the production pipeline, and processing stages of the industry (including natural-gasoline plants and refineries). In addition a study was done on capital costs of the oil-well equipment industry. Cost studies covering both initial and operating costs have been completed recently for the drilling-contractor industry and for crude-oil pipelines.

CHEMICAL-ENGINEERING studies at Lamar Tech are conducted in the unit on the left—the Anthony Lucas Engineering Building. Erected in 1951 at a cost of $1,000,000, it has three wings.

TEXAS PETROLEUM ENGINEERING SCHOOLS

Lamar State Now a 4-Year Institution; Offers Evening Courses to Employed Personnel

LAMAR State College of Technology, at Beaumont, Tex., was established September 1, 1951, as a 4-year state-supported college. It is the successor to Lamar Junior College.

A new Anthony F. Lucas Engineering Building was erected in time for occupancy in the fall of 1951. The engineering division consists of six departments granting engineering degrees.

In addition to a standard day-school program, the college offers courses in the evening for the benefit of employed personnel in the Sabine area. It is possible to take a degree at night and at the present time there are about 200 persons seeking degrees in the evening session in the division of engineering.

The day enrollment has increased to about 350 and about 200 freshmen engineers are expected in the fall of 1954. The college's total enrollment was more than 3,080 last fall and an increase of about 20 per cent is predicted for next fall.

Lamar Tech had its first graduating class in the spring of 1953. Most of the graduates have entered industry in the Gulf Coast area. Although young, in the engineering field, the college already has a club established by Sigma Xi, and student chapters of the American Institute for Chemical Engineers, the American Chemical Society, and the Texas Society of Professional Engineers.

Dr. Tiller Is Director

Dr. Frank M. Tiller, who won the A.I.Ch.E. junior achievement award 3 years ago and has earned a national reputation for research work done in filtration, is director of the engineering division.

The Lamar Tech Research Center recently came into official existence. The center was established for the purpose of serving industries in the Southwest.

Heads of the various departments in engineering at Lamar Tech, with their last school, are: Dr. Tiller, (University of Cincinnati), chemical engineering; W. C. Schoeller, (University of Texas), civil engineering; Lloyd B. Cherry, (Oklahoma A.&M.), electrical engineering; George B. Tims, Jr., (Oklahoma A.&M.), industrial engineering; Dr. W. J. Conner, (Tulane University), mathematics, and Ernest C. Holdredge, (Texas A.&M.), mechanical engineering.

DR. C. E. HUCKABA, associate professor, checks the work of two Lamar seniors.

Spacious, well-lighted, air-conditioned drawing room in the new engineering building at Texas A. & I. College, at Kingsville.

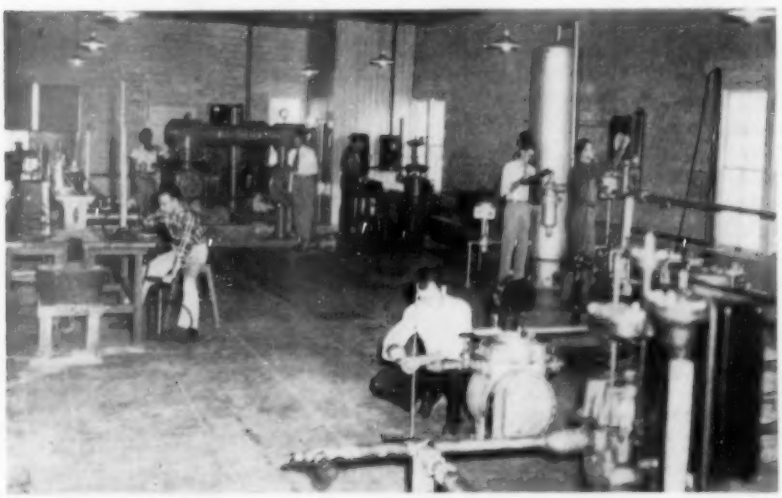
TEXAS PETROLEUM ENGINEERING SCHOOLS

Specialized Training at A. & I.

PETROLEUM and natural-gas engineering, as offered by the engineering division of the Texas College of Arts and Industries, Kingsville, Tex., was initiated in September 1935. Organizers were a group of men in the natural-gas industry who foresaw the present phenomenal growth of the industry and planned a program in Texas at that early date whereby specialized engineers, trained primarily in natural-gas operations, would be available as the industry developed.

The work in petroleum and natural-gas engineering was planned and is being carried out under the supervision of an industry committee of the natural-gas industry, led by Frank C. Smith, president, Houston Natural Gas Corp., and a member of the board of directors, Texas College of Arts and Industries. John F. Lynch, president of the board of directors of the college and president of La Gloria Corp., has been active.

R. R. Suttle, managing director, Southern Gas Association, recently organized and heads a special industry committee through which the natural-gas companies of the Southwest have made available to the college a complete all-year air-conditioning unit to be used for research study and to air-condition the new $250,000 engineering building.



Completely modernized natural-gas-production and measurement laboratory.

The graduate phase of the program leading to a master's degree was initiated in September 1951. Now, a student can proceed through both his undergraduate and graduate work at the college, supplemented with valuable practical experience by employment in industry during the summer vacation.

The college, located in the midst of the second-largest natural-gas field and the largest gas-condensate field in the country and with a high-pressure gas condensate well on the campus, affords laboratory field studies of invaluable aid to the student.

The bachelor's degree in petroleum and natural-gas engineering requires the completion of 157 credit hours taken over a period of 4½ years. The student may parallel this work and obtain a reserve officer's commission in the Reserve Officers' Training Corps of the college, activated in the fall of 1951. A total of 214 graduates have selected this work and obtained their degrees.

The enrollment in engineering is presently 300 full-time students. This represents about 25 per cent of the full-time coeducational enrollment at the college. Of the 300 engineers enrolled, one-half are majoring in petroleum and natural-gas engineering. The enrollment in all sections of the division of engineering is increasing with the present enrollment double that of 2 years ago.

Faculty and Courses

Frank H. Dotterweich, B.E., Ph.D., professor and director, lecturer in chemical engineering, natural-gas processes, combustion engineering.

C. V. Mooney, B.S., M.E. associate professor, lecturer in petroleum and natural-gas engineering, condensate and natural-gas production, distribution and transmission, gas measurement, and air conditioning.

Marcus M. Truitt, B.S., M.S., "Engineer," assistant professor, lecturer in physical and historical geology, stratigraphic and structural geology, and fluid mechanics.

Supporting Faculty

Emerson Korges, B.S., M.S., associate professor, lecturer in theormodynamics and heat engines.

John R. Guinn, B.S., M.S., assistant professor, lecturer in elements of electrical engineering and dynamics.

Paul Treptow, B.S., M.S., instructor, lecturer in statistics and strength of materials.

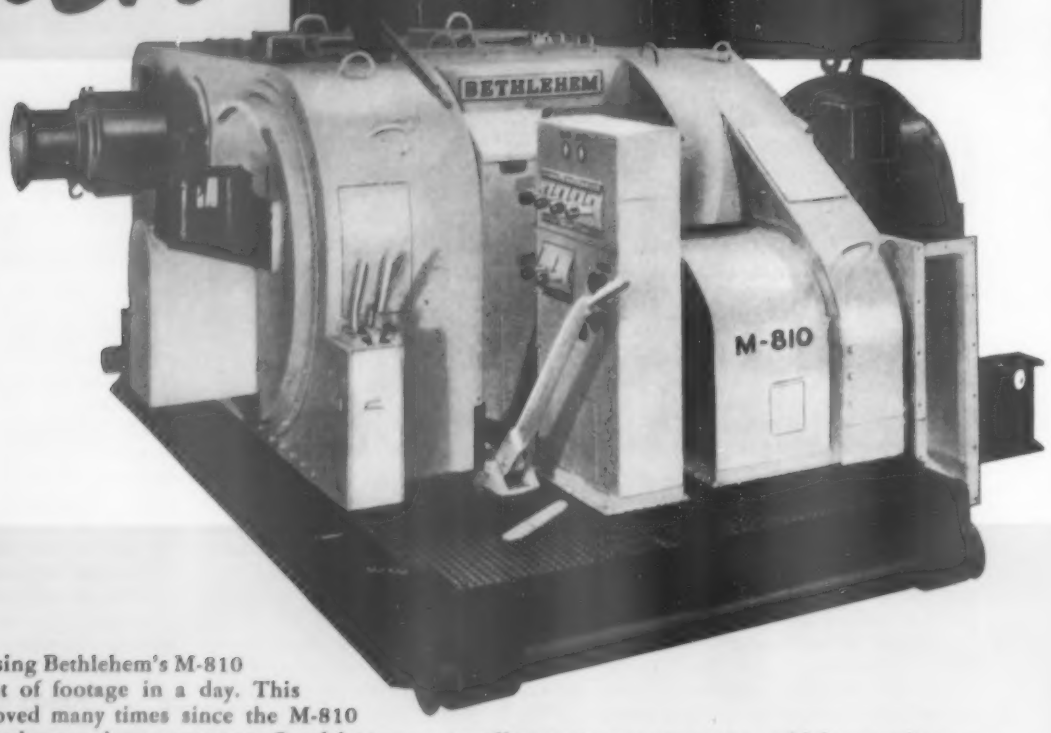
Ben P. Bailey, B.S., M.S., associate professor, lecturer in surveying, engineering drawing and descriptive geometry.

Research Projects

1. "Air Conditioning Refrigeration": Studies are being conducted toward the design and development of refrigeration units. Present laboratory tests include test runs on absorption refrigeration units of 10 and

(Continued on page 198)

The M-810 makes hole fast



A hook-up using Bethlehem's M-810 can log a lot of footage in a day. This has been proved many times since the M-810 was introduced more than a year ago. Careful comparisons have shown that there is no finer rig built in the medium-heavy drilling class.

The M-810 is soundly engineered to combine all the features needed for speed and durability. Features that keep it in action so that the job can be pushed ahead fast.

Here, for example, is a rig with tremendous clutch capacity (low-speed drum clutch, 102,000 ft-lb). It is equipped with extra-powerful 52-in. brakes. It can be furnished with two- or three-engine drive having single or double pump drive, the pump drive being Airflex-clutch-controlled. Engine compound and drawworks transmission clutches are of disengaging spline type; master and high- and low-speed drum-drive clutches are air-actuated friction type.

You have your choice of mechanical drive, fluid coupling, or torque-converter—whichever suits your needs.

And don't overlook this very good point: the M-810 is an easy rig to move, for the engine compound is sectionalized, and the overall width of the drawworks is well within required road limits.

Our engineers would like to tell you more about this powerful rig. Then, if you'd like to see it in action, a trip to the field can easily be arranged.

Optional Feature

Whenever desired, the M-810 can be furnished with an upper drum to facilitate coring and bailing work.

BETHLEHEM STEEL

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

TWO DECADES OF CONSERVATION

In 1953 Texas produced and sold 1 billion barrels of oil, and still increased liquid reserves at same level of the year before

by Lt. Gen. Ernest O. Thompson

I BELIEVE it can be said in all modesty, but with emphasis, that Texas has tried sincerely to do her honest part in conservation of oil and gas since 1932 when conservation became a pressing need due to the discovery of East Texas oil field and the deluge of oil that come from that prolific field.

The key to our law is physical waste prevention and the market-demand statute, which says that production in excess of transportation facilities or market demand is waste and is prohibited. The statute imposes upon the Railroad Commission of Texas the duty of ascertaining the reasonable market demand for Texas crude, and charges the commission with the duty of prorating this market demand ratably and fairly among the wells and fields of the state.

Twenty years ago Texas was producing 740,000 bbl. of oil per day. Today Texas is producing around 2,700,000 bbl. per day. Last year, in 1953, Texas produced and sold 1 billion barrels of oil, and still was able to increase her liquid petroleum reserves at the same level of the year before. In other words, Texas was able to meet all demand for Texas crude and still build up her reserves in a small amount.

At the start of 1954 Texas held 53.1 per cent of the total known reserves, while she produced 44.5 per cent of the oil and gas liquids of the nation. The amount that Texas increased her reserves last year was 82,452,000 bbl., to a grand total of 18,265,000,862 bbl. of oil in the ground and recoverable under present known production practices. The nation's total is 34,382,750,000 bbl.

How Conservation Is Supervised

The secret of Texas' success in her conservation efforts is the thorough preparation of the technical and statistical data upon which our oil and gas conservation orders are based.

In the first place, for every oil well that is drilled in Texas, the operator must first, before drilling is started, obtain a permit from the Railroad Commission of Texas to drill said well; and the application must state that the drilling has not started. When the permit is granted, the well may be started if properly spaced; and the depth intention is contained in the permit. This gives the commission the absolute knowledge of every well location when it is drilled.

The casing is tested as the well goes down, and when the well is finished the potential test is made by commission inspectors; and then the proper allowable is assigned to the well.

If it is a new field, a new-discovery allowable is allowed for each of the first five wells, or for 18 months, whichever comes about quicker. This new-discovery allowable is to encourage wildcatting, and has been most helpful in encouraging new discoveries in Texas.

Texas has today 147,500 wells, and averages an increase of about 160 wells per week. There are 4,059 separate oil-producing fields and horizons in the state. Each is considered as a separate producing unit and separate producing mechanism, and is treated in just that manner so that the greatest ultimate recovery may be had from each and every oil field in the state.

Regularly called commission hearings are held at least every 6 months, or more often if necessary, on the most efficient rate of production of each and every producing horizon in the state, to the end that we may know authoritatively what is the most efficient rate so that we will never exceed that rate in fixing allowables.

The total production for the State of Texas, as stated before, is 2,740,000 bbl. per day; and when you divide that production by the number of wells, 147,500, it will be seen that it is less than 19 bbl. per well average for the state.

The commission each month inquires of the purchasing companies as to how much oil they will positively buy on firm nominations for the next succeeding month, and their best estimate on their needs for the succeeding 5 months. The same is done as to all importing companies, in making inquiry of these importers how much oil they imported the previous month by gravities and by countries, and how much they intend to import for the next succeeding 5 months. This gives us an index on imports.

We have, frankly, tried to keep the importing companies from supplanting Texas production. We recognize that it is proper to supplant domestic production with some grades of foreign oil, but we strongly contend that this supplementing should not reach the extent of supplanting good gasoline-producing crudes that are available in good supply in this country.

Periodic Surveys of Supply

After the commission has received its nominations, it considers in an advisory way the Bureau of Mines' recommendation of the amount of crude of Texas origin needed to fill the demand requirements for the succeeding month.

THE AUTHOR

Lieut. Gen. Ernest O. Thompson, chairman of the Railroad Commission of Texas, is regarded as one of the world's foremost authorities on oil conservation. A soldier who has served in two world wars, he is now commanding officer of the Texas National Guard. He has been a member of the Railroad Commission of Texas—the state's regulatory body of the oil and gas industries—since 1932, and was one of the authors and thrice chairman of the Interstate Oil Compact Commission.

He attended the World Petroleum Congress in Paris in 1937 as President Roosevelt's personal representative, and in 1951 he attended a similar meeting at The Hague as one of the U. S. Government's two official representatives. He has written many papers on conservation and prevention of waste of our oil and gas resources, and has made numerous addresses on this topic.

The A.P.I. in recognition of his long career in petroleum conservation, awarded Thompson its "Gold Medal for Distinguished Achievement" in 1951.

This crude requirement of Texas origin may come either from withdrawals of Texas-origin crudes or from current production.

It was interesting to note that at the March 18, 1954, hearing the minimum average of stocks required in order to have adequate operation was about 268,000,000 bbl., according to the estimate of the various companies, whereas crude stocks of the nation stood at 261 million barrels. This illustrates how the commission acts. If storage is at required minimum, then of course the crude requirements for the succeeding month should come from current production rather than from further draft on storage.

At this recent hearing, the commission made further inquiry as to gasoline stocks, on the theory that gasoline stocks must be considered along with crude, because gasoline stocks are nothing but crude equivalent converted into products.

It was interesting to note that the companies, when asked for testimony by an authorized authoritative representative, greatly changed in some instances their estimates of the amount of gasoline they had on hand because they had not deducted products line fill and necessary storage requirements from their total stocks. The comments adduced at the hearing are interesting. Some companies on reconsideration greatly reduced their estimates of available gasoline, as is here shown from the exact summary of the testimony.

It will be noted that Texas has been reducing her stocks appreciably in the last 6 months and had reduced crudes of Texas origin in storage by 14 million barrels, whereas the nation's reduction was only 12 million, which means that while Texas was reducing 14 million barrels other states had in the aggregate increased their storage by 2 million barrels—which makes it a little rugged on Texas.

Reduction in Gas Flaring

One of the greatest accomplishments of the Railroad Commission in connection with gas conservation has been the great success in the reduction of flaring from oil wells. More than a billion feet that formerly flared into the air is now being saved. And the state is, incidentally, also saving 427,000 bbl. per day of natural gasoline and natural-gas liquids as an incident to this saving process.

The Railroad Commission of Texas has been singularly fortunate in having good success in collecting accurate data, and in analyzing this data and applying it with the rule of reason to conservation, with success that has been noted above.

We have met all demands and have constantly increased our reserves.

We have tried to be good stewards in our conservation work in Texas. We consider that far more than mere petroleum is involved. Allied with the profit incentive in oil and gas production is the question of survival of this nation and the free world, because oil is vital to our security.

Company—	Net days' supply available	Remarks
Atlantic	9	We don't feel overburdened. On June 30 we will be 4.2 days' supply too low.
Cities Service	18	Of 50 days' supply on hand, 32 are unavailable.
Continental	22	Supply quite satisfactory. Less than a year ago.
Eastern States	33	Of 50 days' supply on hand, a third isn't available. Have reduced gasoline production a third. Do not consider ourselves overburdened.
Gulf	38	This is a little heavy for us, about 10 per cent. Expect a 5 per cent increase in demand leaving 5 per cent overstocked.
Humble	17	We think there's plenty of gasoline available.
Magnolia	12.4	We feel our stocks are about right; 13 to 15 days' supply is a comfortable figure for us.
Phillips	22	This is just about right for us.
Shell	17	This is U. S.-wide figure. East of Rockies we have 15. We aren't burdened.
Sinclair	26.5	We have more gasoline than we like to have, but aren't burdened.
Socony-Vacuum	38	We consider this amount satisfactory.
Standard (N. J.)	6	This is our net available stock.
Sun	15.7	This amount isn't considered long. It's very comfortable, if anything a little short.
Texas Co.	20	Normal. About in line.
Stanolind	26	Comfortable. About right.

Specialized Training At A. & I.

(Continued from page 195)

25-ton capacity. Other types of gas-refrigeration units are in the stage of design and development.

2. "Cooling-Tower Design and Operation": Dithermal natural-draft cooling-tower operation and design is under test and development. Adidtional studies are being conducted on maintenance problems in cooling-tower operation.

3. "Natural-Gas Jet Compressors": In the throttling of high-pressure natural gas to pipeline pressure, useful energy is being wasted. Gas-jet compressors utilize this throttling energy to aspirate and boost low-pressure field gas to pipeline pressure by the use of this high-pressure motive gas. A test unit is in the field for test and development work on a dually completed gas well with high and low-pressure natural gas.

4. "Natural-Gas Odorization": A continuous program of natural-gas odorant evaluation is being conducted. Room tests are used with a procedure developed at Texas A. & I. to evaluate various commercial gas odorants.

5. "Subsurface Water Reserve of the Lower Gulf Coast": In many locations in this area, the limiting factor of industrial gas expansion is the availability of water. This work has made available the amount of subsurface water being withdrawn in the Kingsville-Bishop, Tex., area and the rate at which it is being replaced. This work is being continued to include storage of surface water in subsurface sands by injection-well operations. Also a qualitative analysis of the water through the sand is now in progress.

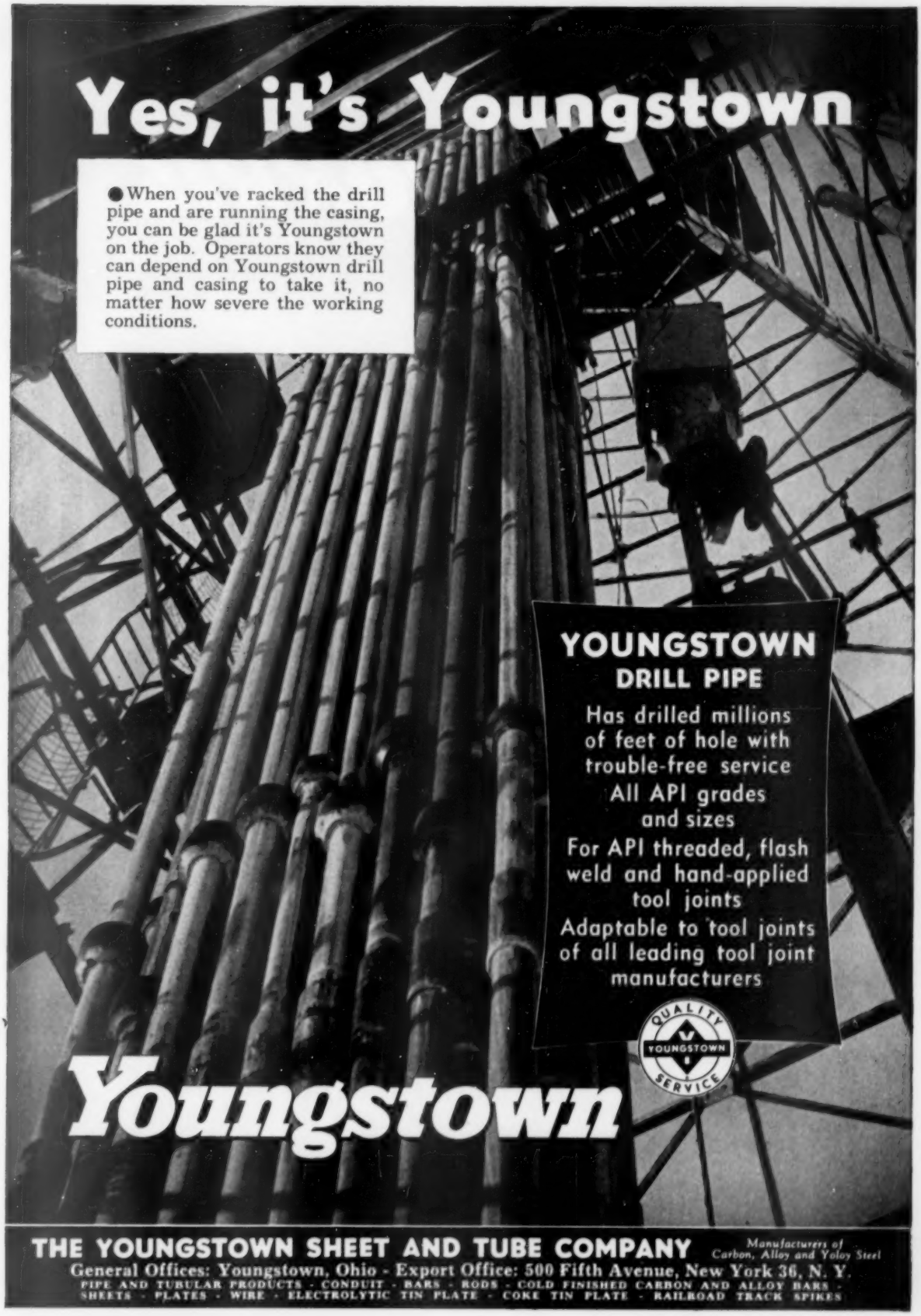
6. "Weather Observations with Radar": One S C R 545 radar outfit, the property of the division of engineering, is presently in Corpus Christi on loan to observe the approach of cold fronts and hurricanes. This unit operated by the U. S. Weather Bureau is a link in the weather-protection program along the industrialized Gulf Coast and the project is sponsored by an industry cooperative committee.

7. "Aluminum-Copper Connectors": Studies are being conducted on the performance of various types of connectors involving aluminum and copper material under varied conditions of current and outdoor exposure.

Short Course in Gas Technology

The short course in gas technology offered by the college and sponsored by the Southern Gas Association continues to be a popular method whereby gas engineers of the South assemble yearly to refresh themselves in the recent developments in the gathering, conditioning, transmission, and utilization of natural gas. The enrollment in the course is limited to about 200 representatives of member companies of Southern Gas Association.

The ninth annual short course in gas technology will be held at Texas A. & I. on June 2, 3, and 4, 1954. The administrative committee with guidance from the advisory committee selects subjects of current national importance to be presented and obtains the speakers. Leading experts in the fields of production, conditioning, and transmission of natural gas conduct classes throughout the 3-day meeting and in addition, inspection trips are arranged to the variety of industrial plants in the area.


Yes, it's Youngstown
When you've racked the drill pipe and are running the casing, you can be glad it's Youngstown on the job. Operators know they can depend on Youngstown drill pipe and casing to take it, no matter how severe the working conditions.
YOUNGSTOWN
DRILL PIPE
Has drilled millions of feet of hole with trouble-free service
All API grades and sizes
For API threaded, flash weld and hand-applied tool joints
Adaptable to tool joints of all leading tool joint manufacturers
QUALITY
YOUNGSTOWN
SERVICE
Youngstown

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

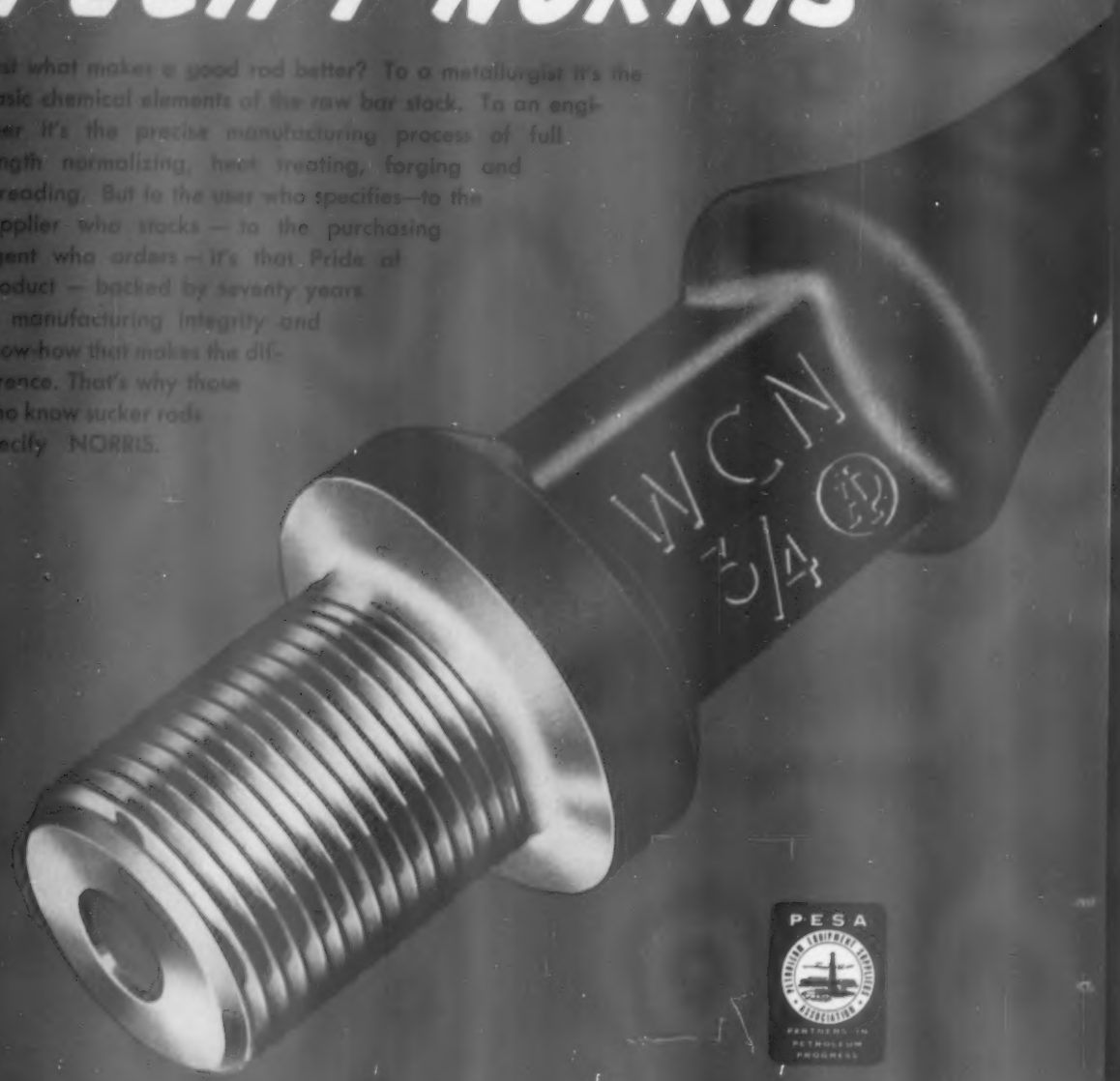
General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

Those Who Know Sucker Rods

SPECIFY NORRIS

Just what makes a good rod better? To a metallurgist it's the basic chemical elements of the raw bar stock. To an engineer it's the precise manufacturing process of full length normalizing, heat treating, forging and threading. But to the user who specifies—to the supplier who stocks — to the purchasing agent who orders — it's that Pride of Product — backed by seventy years of manufacturing integrity and know-how that makes the difference. That's why those who know sucker rods specify NORRIS.



PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

W.C. NORRIS, MANUFACTURER, INC.

TULSA, OKLAHOMA

WEST COAST DISTRIBUTORS
HICKEY PIPE & SUPPLY CO.
Los Angeles

Since NORRIS PRODUCTS 1882

BRANCHES:
HOUSTON, KILGORE, ODESSA, TEXAS;
SALEM, ILLINOIS; CASPER, WYOMING

EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

Texas Conservation Regulations Are Based On Sound Engineering Principles

Railroad Commission has staff of competent, trained technical men

by Arthur H. Barbeck

THE role of the engineer is becoming increasingly important in the administration of the Texas oil and gas conservation program. The statutes of the State of Texas charge the Texas Railroad Commission with the responsibility of conserving its natural resources of oil and gas, the prevention of waste thereof, and the protection of correlative rights of the various interests involved.

Early in the 1930's, after the discovery of the giant East Texas oil field and Yates field of West Texas, it became increasingly apparent that technology was to play an important role in future oil and gas production in Texas. The Railroad Commission of Texas, recognizing the necessity of securing trained technical assistance to cope with the many complex problems arising daily in the administration of the state's conservation statutes, wisely formed an engineering department, staffed with technologists trained in the field of oil and gas production to assist in deliberations.

When it is considered that there are some 148,000 oil wells and 10,400 gas wells currently producing from 4,082 separate oil and 1,250 separate gas fields, each with its inherent producing characteristics and problems, the tremendous task of exercising careful engineering surveillance can readily be appreciated.

Organization of the Department

Operation of the engineering department is under the direction of Arthur H. Barbeck, chief engineer. Barbeck has as his two immediate assistants, George F. Singletary, Jr., who handles matters regarding the production of crude oil, and the other is James A. Hall, who is in charge of all matters pertaining to natural gas. Each of these two assistant chief engineers has three engineers directly under his supervision in the central office in Austin.

The primary job performed by the three engineers under Singletary is conducting various hearings. This, in itself, is a tremendous undertaking. For example, in the year 1953 the engineering department conducted 2,605 hearings on various subjects such as discovery allowables and new field designations, dual completions, special field rules applicable to particular fields and amendments thereto, exemptions from shutdown days, exceptions to one or more of the 55 state-wide rules and regulations, most efficient rate of production hearings, pressure maintenance and secondary recovery, unitization agreements, and many other items.

Hearings, as outlined above, are conducted in this manner: After due notice to interested parties in the manner prescribed by law, a hearing is held usually in the commission's office in Austin. The engineering and legal examiners hear witnesses under oath, utilizing rules similar to those of a District Court. After all witnesses have been heard and questioned on cross-examination by those desiring to do so at the hearing, and by the engineering or legal examiners, the testimony is reduced to transcript form. Each commissioner then is furnished with a copy of the transcript for study.

The examiner prepares a memorandum to the commission outlining in brief form the facts of the case. The chief engineer or the assistant chief engineer reviews each case with the examiner and after study, recommends appropriate action to the commission. On each Monday a formal conference is held with the three commissioners and each examiner present. The examiner presents the various hearings which he has held that are ready for final action.

At this time an order is issued by the commissioner reciting the fact that a hearing has been had after proper notice, outlining a summary of the statement of facts and finding of facts based upon the evidence adduced at the hearing. This, in turn, is followed by a formal order.

Frequently the commission, the chief engineer, or the assistant chief engineers conduct these hearings whenever a very involved problem is at hand. It must be realized that in many cases there are tremendous issues involved requiring that the examiner be well acquainted with these various matters, both from past field experience and through his technical knowledge, in order that he may properly analyze the facts presented and arrive at a proper recommendation to the commission for final action. It is further imperative that the examiner be practical in his application of theory to all cases that come before his attention.

The three engineers under the supervision of James A. Hall have as their problem the checking of all reports pertaining to natural-gas production and processing. In addition, these men prepare proration schedules for all prorated gas fields comprising both associated and nonassociated fields. Statistics are compiled on many phases of natural-gas operations for the commission and the general public. These engineers also assist and coordinate their work with the examiners on hearings which involve natural gas.

District Offices

In addition, the commission maintains 10 district offices, which are located in San Antonio, Refugio, Houston, Corpus Christi, Palestine, Mount Pleasant, Kilgore, Abilene, San Angelo, Midland, Wichita Falls, and Pampa. There are 38 engineers assigned directly to the various district offices, each in the number necessary for the proper functioning of the particular district. In charge of the engineering in each district is the district engineer, whose duties are as follows:

1. Assist and provide engineering advice to the district supervisor of his particular district.

2. Supervise the engineering staff of the district office.

3. Review, process and properly file engineering reports required by the Oil and Gas Division, as follows:

(a) Form, Application to Drill or Deepen a Well.

(b) Form 2, Well Record Completion and Driller's Log.

(c) Forms 2-A and 4, Application to Plug and subsequent plugging report.

(d) Form 3, Potential Test.

Author is chief engineer, Railroad Commission of Texas.

KNOWN AS THE OIL MAN'S BANK IN OIL CIRCLES

THE CITY NATIONAL BANK OF HOUSTON

CAPITAL AND SURPLUS FIFTEEN MILLION DOLLARS

Member Federal Deposit Insurance Corporation

(e) Form GWT-1, 2, and 3, Back-Pressure Tests of Gas Wells and subsequent testing of gas wells.

(f) Form 3-266A, Reports of Gas-Well Gas Production.

(g) Form GO-1, Report of Condensate Production.

(h) Form GP-1, Gasoline Plant Reports.

(i) Form GO-2 and Net-Gas-Oil Ratio Reports. (These are reports pertaining to gas-oil ratio tests on oil wells.)

In addition to checking these reports, the field engineers conduct well-performance tests on both oil and natural-gas wells; packer leakage tests on dual completions; bottom-hole-pressure tests; temperature surveys; inspections of gasoline plants, recycling plants, and carbon black plants. It is obvious that by checking the foregoing reports and performing these tests, the engineers in the district offices become well informed as to the status of drilling, production, and processing of crude oil and natural gas in their district. Furthermore, irregularities that might occur in any field, such as excessive flaring of gas, improper completions, failure to set sufficient surface casing to protect fresh water sands and the like, can readily be observed, a field check made and corrective action taken. On many occasions these engineers are required to conduct certain tests required by the central office in Austin in connection with hearings which are held before the examiners in Austin. Thus, it may be concluded that a district engineer, as well as the engineers under his supervision, must be possessed with a great deal of tact as well as a thorough grounding in engineering and/or geological fundamentals.

Classifications and Qualifications

The engineers, other than the chief and assistant chief engineers, are grouped into three classifications by statute. The lowest classification is titled "Engineer" and the engineer is required to be a graduate in engineering or geology from an accredited 4-year college or university. This engineer must remain in this grade for at lease 1 year in order to be eligible for promotion to the next higher grade of "Junior Engineer." He must then remain in the grade of junior engineer for 2 years prior to being eligible for promotion to "Senior Engineer." During his tenure in the various grades mentioned above, the engineer is carefully screened with regard to his qualifications for district engineer or for examiner of hearings.

Prior to any engineer's transfer to Austin, especially in the case of examiners, an engineer must have served a minimum of 2 years in a district office before being eligible for such assignment. Whenever possible and unless an engineer is unusually adept, 2 years' service in the field is a minimum requirement before selection as a district engineer.

Interesting Phase of Engineering Work

The commissioners are very interested in conserving gas produced incident to oil production and otherwise known as casing-head gas. As a result, considerable emphasis is placed on this subject by the engineering department, both in the central office as well as in the field. District engineers especially are continually encouraging operators to conserve gas by either returning gas to the reservoir from which it is produced, wherever feasible, or in disposing of the gas to legal use, as prescribed in the statutes of the State of Texas.

In many hearings before the commission evidence is presented by the operators which indicate that considerable casing-head gas is being flared in a certain field, for example, and that such gas, after being processed, can possibly be returned to a reservoir to aid in additional oil recovery. Should this action not be feasible, possibly the residue gas can be marketed or

Florex—for adsorption

Recognized throughout the world as superior to all other natural clays used in adsorption processes, Florex is particularly effective in the adsorptive refining, decolorization, clarification and neutralization of mineral, vegetable, and animal oils, fats and waxes. Florex is also effectively used for sweetening light distillates, dehydration, desulfurization and polymerization.

Florex is prepared from carefully selected natural Florida Fullers Earth by a special processing including high-pressure extrusion, which greatly improves adsorptive efficiency and capacity.

Standard particle sizes are herein reproduced and include meshes from 2/4 to 200/ up. Special meshes are also available. Florex is packaged to fulfill customer's requirements with the Fifty (50) pound non-returnable paper bag the minimum quantity.

For further information use free request coupon below.

FLOREX MESH—ACTUAL SIZE

100-UP
60/100
30/60
16/30
8/16
4/8
2/4

FLORIDIN COMPANY

• Adsorbents
• Desiccants
• Diluents

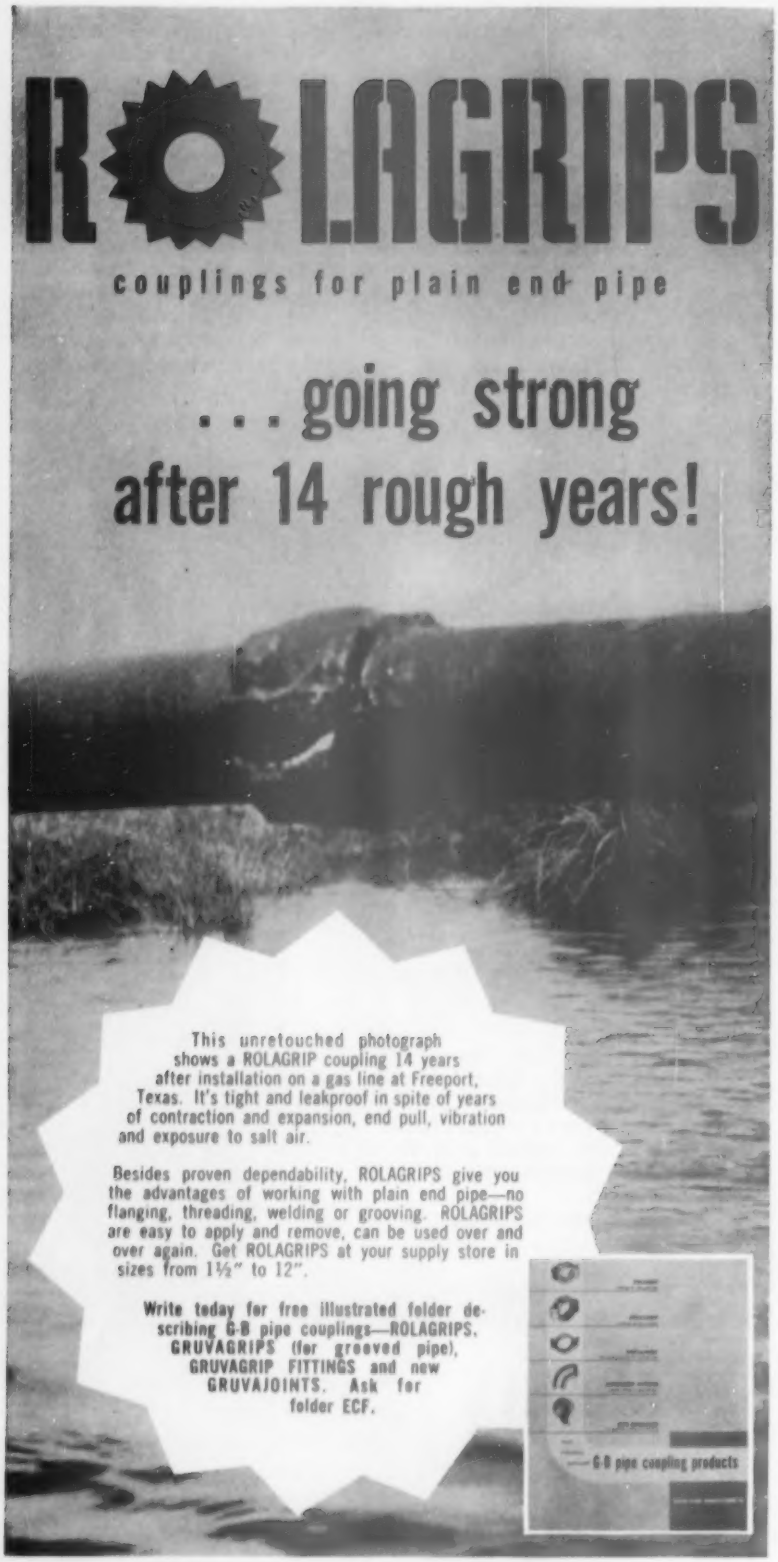
DEPT. C, P. O. BOX 291, TALLAHASSEE, FLORIDA

Please send literature ☐ and sample ☐ of Florex
(Be sure to indicate mesh size_____)

Name_____

Address_____

City_____


ROLAGRIPS
couplings for plain end pipe
. . . going strong
after 14 rough years!
This unretouched photograph shows a ROLAGRIP coupling 14 years after installation on a gas line at Freeport, Texas. It's tight and leakproof in spite of years of contraction and expansion, end pull, vibration and exposure to salt air.
Besides proven dependability, ROLAGRIPS give you the advantages of working with plain end pipe—no flanging, threading, welding or grooving. ROLAGRIPS are easy to apply and remove, can be used over and over again. Get ROLAGRIPS at your supply store in sizes from 1½" to 12".
Write today for free illustrated folder describing G-B pipe couplings—ROLAGRIPS, GRUVAGRIPS (for grooved pipe), GRUVAGRIP FITTINGS and new GRUVAJOINTS. Ask for folder ECF.
G-B pipe coupling products

GUSTIN-BACON MANUFACTURING CO.

210 W. 10th St., Kansas City, Mo.

otherwise put to legal use, thereby minimizing both surface and/or underground waste. Accordingly, the engineering department so advises the commission, whereupon that body reviews the data and recommendations and issues notices of hearing to afford operators in the field the opportunity to present further evidence to show what disposition can be made of such casing-head gas.

As a result of such action the flaring of casing-head gas during the past several years has declined immeasurably, despite the fact that production thereof has increased tremendously with the added increase in oil production since the end of World War II. Furthermore, the industry has cooperated to the extent that in the majority of new fields of any appreciable size, operators, soon after discovery, are immediately examining their reservoir data and are taking immediate steps toward preventing the flaring of this vital resource.

Most efficient rate of production or MER hearings have also played an important roll in the prevention of surface or underground waste. As the result of annual hearings on this subject since 1949, industry has accepted the fact that reservoir analysis is important, even in the initial stages of operation. Through a continuing review of performance data proper rates of production can be found for each reservoir which will result in obtaining the greatest recovery whether by primary methods of operation or by pressure maintenance.

The inevitable result of these hearings is currently bearing fruit as is evidenced by the increasing number of pressure-maintenance and secondary recovery operations, which are mushrooming over the entire state. Thus, it follows that, simply because the commission required wise use of existing reservoir energy and encouraged pressure maintenance and secondary-recovery programs wherever feasible, Texas is fortunate in having a ready excess reserve producing ability should an emergency arise. All of the above has followed as a result of improved technology and by bringing to light the idiosyncrasies of the various reservoirs through MER hearings.

Gas in Middle East

The Saudi Arabian Government plans to construct an ammonium sulfate and dry-ice plant which will utilize natural gas from oil fields of Arabian American Oil Co. This would be the first important commercial use of natural gas in the Middle East. The producing companies in that area now use gas within their own organizations for utilities, to drive pumps and for field use, leaving large excess quantities which must be flared.

TEXAS GAS . . . 300 Per Cent Increase in 10 Years

Name the category—casing head to pipelines to reserves—it's a story of postwar expansion unequaled

by Hon. W. J. Murray, Jr.

LIKE the dinosaur who was so big that he had to eat almost 24 hours a day to keep from starving to death, the gas industry of the United States, and particularly in Texas, must constantly make progress to keep up with the insatiable demand for natural gas and its products.

The industry must be evermore efficient, economical, and diligent to keep proved reserves ahead of consumption in the face of continually increasing difficulty and cost of finding new reserves.

Texas Has Threefold Increase

The cold figures of the 10 years just closed in the Texas gas industry show that in nearly every category there has been roughly a 300 per cent increase from 1943 through 1953.

Take casing-head gas, an area where Texas has made outstanding progress during recent years in making beneficial use of this product which in the early years of the industry was almost entirely flared. The following tabulation of Texas casing-head gas processed and utilized in selected years of the past 10 shows this in dramatic form:

	Casing-head gas, daily average in billion cubic feet	
Year	Processed	Utilized
1943	1.260	1.192
1946	1.583	1.807
1949	1.766	2.097
1953	3.177	3.348

The first thing of significance to note from these data is the rapid increase in the volume of casing head processed and utilized. In 10 years there has been nearly a 300 per cent increase in use of casing head. When it is considered that over one-third of the total reserves of gas in Texas is either dissolved in oil or associated with oil and therefore subject to production as casing head, the importance of this increasing industry awareness of the need for turning casing head to use can be seen.

There are no accurate data available on the total quantity of casing head produced or flared in past years, but we do know that as the quantity processed and utilized has increased the quantity flared has been greatly reduced. If we assume that on an average the same amount of casing-head gas was produced with each barrel of oil in 1953 as in 1943, then it is possible to calculate that of 1,222 billion cubic feet of casing-head gas utilized in 1953, 482 billion cubic feet would have been flared had we been no more efficient percentagewise last year than we were 10 years ago.

It may be further noted from the above table that in 1943 we flared more processed gas at plants than the total quantity of unprocessed gas which was utilized. However, in 1953 we utilized far more unprocessed gas in the field than the relatively small quantity of gas flared at plants.

Gas-well figures are not quite as imposing, growthwise, because of the fact that the industry has laid more stress on putting a former waste product to use than it has in producing gas-well gas, which can wait. In 1943, gas-well gas production totaled 1.6 trillion feet. In 1953, it totaled 3.8 trillion, and at year end, there were 10,257 gas wells producing in Texas.

The development of the interstate pipeline industry during this same 10-year period is one of the postwar miracles. Transmission lines took only 0.8 trillion cubic feet in 1943, but they took 3.4 trillion in 1953, a 400 per cent increase. Of this 3.4-trillion pipeline take, 2.2 trillion was "exported" from Texas to other states. Half of the homes of the nation heated by gas are heated by Texas gas. **Texas gas today is used in 40 states, Canada, Mexico, and the District of Columbia.**

There has also been a rapid increase in the number and size of gas-processing plants and the volume of liquids which they turn out. In 1943, there were 156 gas-processing plants in Texas, and they turned out 27.5 million barrels of liquids. At the close of 1953, there were 385 such plants, and during the year they produced 109.9 million barrels.

The production of 5 million barrels of natural gasoline a month has an important effect on crude-oil allowables, especially when the Railroad Commission takes into consideration the stocks of gasoline in calculating market demand. Since each barrel of natural gasoline is the equivalent, in gasoline, of 3 bbl. of crude, the impact of crude allowables of this production is obvious.

The three-to-one ratio applies to intake of gas by plants. In 1943, the plants took in 373 billion feet of casing head and 568 billion feet of gas-well gas. In 1953, their intakes were 1.1 trillion feet of casing-head gas and 1.8 trillion of gas-well gas.

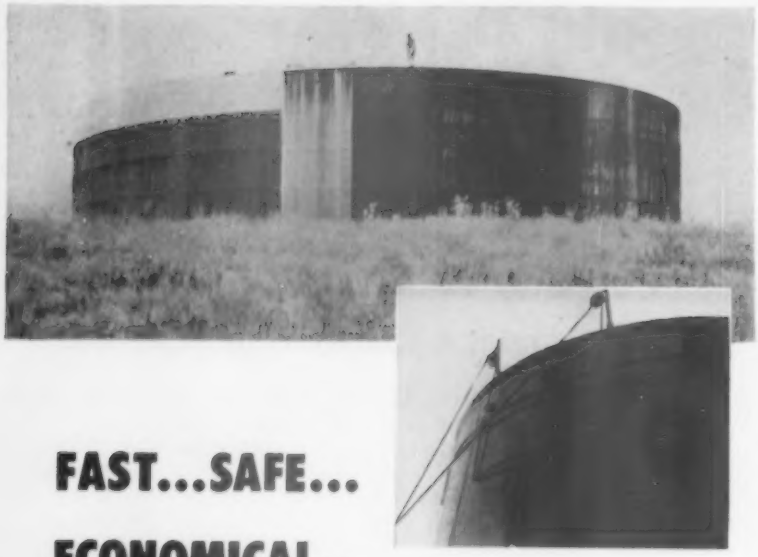
L.P.G. Industry in Texas

The bouncing baby boy of the gas industry, L.P.G., has literally grown like a weed. In 1943, the plants in Texas turned out only 4.3 million barrels of butane and propane. By 1953, output had increased nearly tenfold, to 39.3 million. Growth of this kind has created problems of storage, marketing, and supervision. The Railroad Commis-

THE AUTHOR

W. J. (Bill) Murray, Jr., member of the Railroad Commission of Texas since 1947, has the academic, business, and government experience to speak of conservation broadly and well. A graduate of University of Texas and later instructor there, he was associated with his father as an independent oil producer for several years before being employed by the Oil and Gas Division of the Railroad Commission of Texas as a senior engineer and chief examiner. He was appointed to the Railroad Commission in 1947 to serve out an unexpired term, and in 1950 he was elected to serve a full 6-year term.

Born in Coleman, Tex., . . . reared in the Texas oil fields . . . a product of Texas schools . . . and a member of several Texas regulatory bodies, he is well qualified to explain his state's conservation needs.



FAST...SAFE...

ECONOMICAL...

That's the story on Oakite's Hot Flow-on Tank-stripping method

Here's how it works: The inset shows the rake-like apparatus used for applying the stripping solution. Solutions of Oakite Stripper M-3 are heated to about 200°F., pumped up lines and allowed to flow through the rake, down the sides of the tank. Solutions are gathered in tank-fitting canvas receptacle at bottom and recirculated. The large photo above shows the stripping solution cascading down the sides of tank . . . carrying old paint with it.

What are the important advantages of this Oakite Hot Flow-on method?

. . . ***It's fast:*** **Storage tanks of from 55,000 to 80,000 gallon capacity can be stripped under normal conditions in 3 days after equipment is set up. Equipment is quickly constructed, easily transported to job site.**

. . . ***It's safe:*** **Oakite Stripping agents, mixed with water, are non-flammable. Nothing to cause dangerous sparking from static electricity. No sand to foul valves, pipe lines, metering devices.**

. . . ***It's economical:*** **Stripping solutions are reclaimed and reused, no evaporation. Less effort needed! gravity does most of the work. Equipment is standard, inexpensive.**

And remember, an Oakite Technical Service Representative is always available to help you set up this widely-used system.

You'll want more information on this efficient method of keeping your tank appearance up . . . corrosion and leakage down. Write now for our FREE 48-page guide on "What Petroleum Men Should Know to Simplify Cleaning." Oakite Products, Inc., 44C Rector Street, N. Y. 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

sion has acquired a new job, and a new L.P.G. division, charged with licensing and supervising the L.P.G. dealers and installers. Texas ingenuity devised a way to store summer L.P.G. production cheaply, in underground salt cavities, and many thousands of rural homes have gained an easier way of life as a result of the L.P.G. industry's growth.

Number of cycling plants has not shown a great increase in Texas over the 10-year period, but the size of the plants has grown. At the end of 1943, there were 29 plants, which during that year took 592 billion cubic feet of gas, of which 483 billion was returned to the producing horizons, and only 55 billion went to transmission lines. Ten years later there were 32 plants, which took in 923 billion feet, returned 491 billion to the reservoir, and sold 311 billion to transmission lines. Where the plants of 1943 wound up with 13.7 million barrels of liquids, those of 1953 recovered 28.3 million barrels. The change in attitude about waste of gas is demonstrated by the fact that in 1943 the cycling plants flared 6.9 billion feet of gas. In 1953 they flared only 10 per cent as much, 679 million feet.

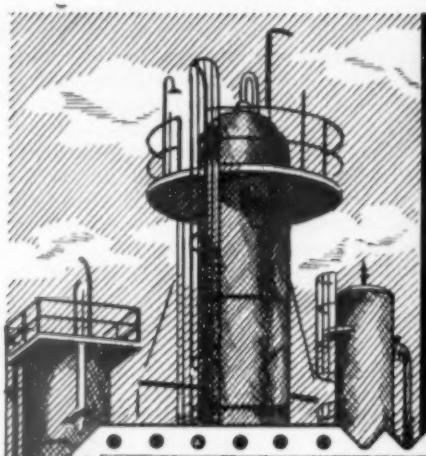
Any way you look at the Texas gas picture, it is three times as big in 1953 as it was 10 years ago. The category of hydrocarbon liquids produced from gas wells, in field or plant facilities, shows it, too. The 1943 total was 46 million barrels. Ten years later the annual rate was 153 million.

Pressure Maintenance

Another new category, indicating the new look in the industry's eye at the business of conserving precious reservoir energy is in the field of pressure maintenance or repressuring plants. In 1943, 139 billion cubic feet was pumped back into Texas oil reservoirs to increase oil recovery. In 1953, 287 billion cubic feet was injected for this purpose.

In the field of carbon-black operations, the more efficient usage of gas is striking. The 37 plants in operation in 1943 used 276 billion feet of gas making 407 million pounds of black, an average recovery of 1.48 lb. per M.c.f. The 1953 figures show an improved picture, with 25 plants using 197 billion feet of gas to produce 540 million pounds of black, an average of 2.74 lb. per M.c.f. They have learned to get more with less in this phase of the industry, and we whose job is conservation are pleased to see the old, inefficient plants abandoned and replaced with more modern ones.

In every phase of the Texas gas industry, I think we can safely say that



INCREASE throughput capacity
ELIMINATE costly liquid loss
IMPROVE overhead product quality
REDUCE harmful air pollution
with

YORKMESH DeMISTERS

CASE STUDY NO. 1003

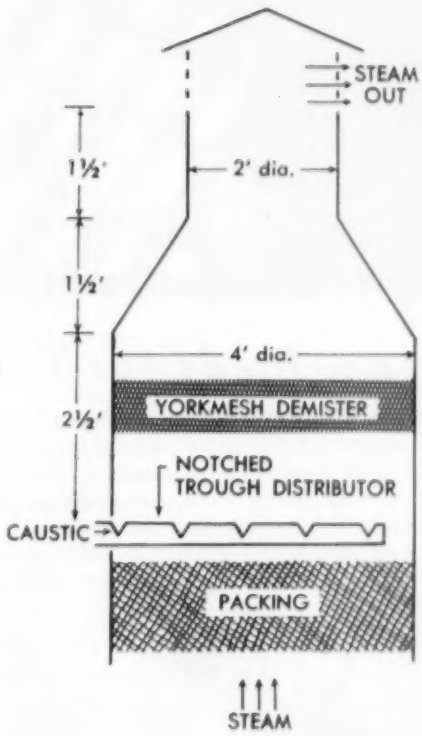
MONEL YORKMESH DeMISTER ELIMINATES CAUSTIC SPRAY

OBJECTIVE:
To eliminate an air pollution problem caused by a fine caustic spray from a scrubbing tower.

PROBLEM:
A four foot diameter tower employing caustic soda to scrub an organic material from steam gave rise to an objectionable finely divided caustic spray from the open top of the scrubber when operated at a steam rate of 3000#/hr.

SOLUTION:
A 6" thick monel Yorkmesh Demister was installed.

RESULTS:
The objectionable caustic spray on the surrounding area was eliminated entirely.



Note: for details and full description of installation write for case study No. 1003

YORK

OTTO H. YORK CO., INC.

69 GLENWOOD PLACE, EAST ORANGE, N.J.

Custom-Made for YOUR Job!

Electronically Weldforged and Bonderized for greater safety, strength and longer life, Kerrigan grating is custom fabricated to your exact requirements. Our large drafting staff is at your service to prepare drawings subject to your approval and to supervise fabrication . . . . and the finished grating comes to you well marked and identified for low cost installation.

Bearing bars, and cross bars alternating right and left for the utmost in safety, are weldforged into one-piece, inseparable units. Write for your FREE copy of illustrated booklet as shown. It contains complete engineering data and shows how Kerrigan's *never-fail* weld stands up under the severest kind of punishment.

KERRIGAN IRON WORKS, Inc.

General Sales Office — 274 Madison Ave. — New York City

we are making higher uses of our gas than we were 10 years ago, and stretching it a little further. At the time this article is being written, estimates of proved recoverable reserves of natural gas in the United States have just been released in a joint report of the Reserves Committee of the American Gas Association and the American Petroleum Institute.

It is most significant to note that as of December 31, 1953, the nation's reserves of natural gas stood at 211.4 trillion cubic feet, which is an all-time record figure and nearly 12 trillion cubic feet above the reserves 1 year earlier. This new high was reached despite the consumption of 9.2 trillion feet, a record amount, in 1953.

Outstanding Achievement

Since the future progress and security of the nation are largely dependent upon the available natural sources of energy, and since the percentage of the nation's energy needs supplied by natural gas is increasing with astounding rapidity, the citizens of our nation—and particularly the present and potential consumers of natural gas—should be gratified by this outstanding achievement of the American petroleum industry. It is gratifying to see this marked increase of recoverable reserves in spite of record high rates of production.

Since Texas had slightly over one-half of the recoverable reserves of natural gas in the nation, Texas naturally takes great pride in this tremendous increase in national reserves. By extensions and revisions of reserve estimates of old pools, and by discovery of new pools, there was a total of 5.4 trillion cubic feet of new gas reserves developed in Texas in 1953. This is substantially greater than the new reserves developed in any other state during the year.

However, after deducting the 4.6 trillion cubic feet of production in Texas during 1953, the net increase in proved reserves in Texas was less than the net increase in Kansas, Louisiana, New Mexico, and Utah. Furthermore, it may be noted that while Texas has one-half the proved reserves of the nation, the new reserves found in Texas during 1953 amounted to only one-quarter of the new reserves of the nation.

This set of facts points up very clearly the tremendous difficulty of just keeping up, and why the Texas gas dinosaur has to eat almost 24 hours a day to keep from starving to death, and why he has to learn to be efficient, economical, and diligent to keep from becoming extinct.

TRADE PAPER EDITION
Published by
SCHUTTE and KOERTING
Company

ENGINEERING *News*

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

Why Should You Come To SK For Standard Or Special Heat Transfer Equipment?

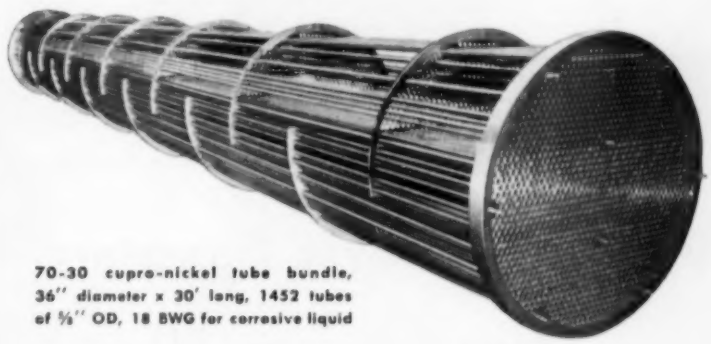
Have you, or are you likely to have, a problem in Heat Transfer involving *special* heavy duty equipment? Does your problem involve out-of-the-ordinary materials, highest precision and uniformity requirements, better than ordinary test and quality control facilities? Would you like to have technical assistance from HT specialists with wide experience?

Or do you just need a well designed, carefully built standard Heat Transfer Unit?

SK manufactures standard equipment, designs and builds special equipment for heat transfer service for pressures up to 5000 psi, temperatures to 1100° F.

And, *here's why* you should come to SK for such equipment—

All SK Heat Transfer Units feature: (1) close tolerances between tube OD and tube sheet hole ID; (2) polished tube ends to insure best metal to metal joint between tube OD and tube hole; (3) shell bores to exact tolerances to insure close fitting baffles for top efficiency; (4) rigid inspection of materials, methods, final assembly; (5) A.S.M.E. Code qualifications; and (6) electronically controlled tube expansion*. SK is particularly well equipped to solve unusual HT requirements, because . . .



70-30 cupro-nickel tube bundle, 36" diameter x 30' long, 1452 tubes of ⅝" OD, 18 BWG for corrosive liquid

SK has specialized in HT problem solving for a great many years—is set-up operationally for this.

The engineering staff is experienced—includes Chemical, Industrial, and Mechanical Engineers who *understand* chemical, power, processing, marine requirements, who *think* on the level you will require, who *talk* your language.

SK research facilities are set up to *anticipate* future requirements.

Production facilities are such that the company has been able to provide radiafin air coolers rated at 7500 hp weighing 47,000 lbs. . . . heat exchangers with special Everdur tube bundles, shells and head lining . . . 36" diameter, 30' long cupro-nickel units for cooling sodium carbonate solution for liquid rheostats . . . special units for handling hydrocarbon gases and synthetic rubber.

Quality Control and test facilities include equipment for hydrostatic, magnaflux, pneumatic, temperature shock, polariscope testing and radiographic inspection (250,000 Volt X-ray machine; Cobalt 60).

Space will not permit many other details worth noting but, if you want more information, do this: (1) write for Bulletin HT-1 which describes the type equipment we make, or (2) request a copy of Vol. 5 No. 3 Engineering News which contains an article on our problem-solving facilities.

***Tubes being expanded using electronically controlled tube rolling machine. This method provides advantages as follows: (1) every tube is expanded uniformly with no over or under expansion, (2) there is no enlargement of tube holes, (3) ligament fracture is prevented, (4) there is minimum tube elongation and tube sheet warpage is reduced, (5) tube wall stresses are reduced, (6) guess work is eliminated, ideal standards for tube joints apply.**

SCHUTTE and KOERTING Company

Manufacturing Engineers

23 STATE ROAD
CORNWELLS HEIGHTS
BUCKS COUNTY, PA.

Representatives in Principal Cities

Dr. George H. Fancher, director of the Texas Petroleum Research Committee.

T.P.R.C. Aids Texas Operators In Secondary-Recovery Efforts

Purpose: Bring to surface 15½ billion barrels of oil which eluded primary recovery

by Dr. George H. Fancher

REALIZING that operators were leaving in the ground at least as much oil as they were taking out by conventional producing methods in Texas, University of Texas, A. & M. College of Texas, and the Railroad Commission of Texas in 1947 established the Texas Petroleum Research Committee to seek ways of recovering this "hidden" oil.

The primary purpose of the committee since its inception has been to turn its scientific knowledge and practical experience on the problem of recovering the estimated 15½ billion barrels of additional oil known to exist in already proved territory which could not be recovered by primary methods.

The committee was set up by a joint resolution of the board of regents of University of Texas; the board of directors of A. & M. College System; and the Railroad Commission, with Dr. George Fancher, formerly professor at University of Texas' petroleum-engineering department, as director.

Other committee members include: The steering committee composed of Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission; Dr. Thomas Harrington, chancellor of A. & M. College System; Dr. Logan Wilson, president of University of Texas (the chancellor of the university is the nominal member of the committee but Dr. Wilson is filling this position until the chancellor's post is filled); and the technical committee composed of Prof. Albert B. Stevens and Prof. Robert L. Whiting of A. & M. College; Hon. William J. Murray, Jr., of the Railroad Commission; and Dr. Harry H. Power, head, and Dr. E. W. Hough, instructor, both with University of Texas' petroleum-engineering department.

Financing . . . Money for establishment of the laboratories, building a foundation for the technical staff, and undertaking the first studies toward accomplishing its purpose of seeing that the state recovers one of its greatest sources of wealth through improved secondary-recovery techniques, has been provided for by both universities, each of which has much at stake with its own oil-land holdings. The state legislature now provides support for the work of the committee by appropriation.

The Railroad Commission has furnished guidance based on its practical experience and has made available its records as a basis for the various studies.

How committee works . . . The problem of obtaining that hidden oil is being approached by the following methods:

. . . Experimental and applied research, providing useful data, new techniques, and new processes.

. . . Improved graduate instruction in petroleum engineering.

. . . Training of skilled scientists and technologists in the state for work in Texas' oil industry.

. . . Prompt publication of results of the various research programs.

. . . Periodic public conferences, of which the committee has sponsored six to date, with oil operators, petroleum engineers and geologists, and other interested Texans who are engaged in oil.

. . . Promoting conservation of oil and natural gas.

. . . Cooperative research with oil and gas companies, both in the laboratory and in the field.

Oil-recovery conferences . . . Since the committee's establishment, there have been seven oil-recovery conferences.

The first conference was devoted to secondary-recovery work in Texas in general. Second conference was a study of limestone reservoirs with special emphasis on the Scurry County reef fields; the third devoted to the Spraberry Trend fields; the fourth took up oil-recovery technology; the fifth was devoted to the use of punch-card business machines in petroleum engineering; and the sixth to water-supply problems and recovery technology.

A conference is being planned on the Wilcox Trend fields tentatively scheduled for next December. Some thought is being given to the preparation of a symposium on the general subject of testing of natural-gas wells, with particular attention to determination of potentials and deliverability from back-pressure tests or other techniques.

Current projects . . . One of the largest undertakings by the committee is a comprehensive report on Texas' crude-oil reserves. In addition, work is being done on ths publication of numerous papers arising from the laboratory research of T.P.R.C. staff members.

RESEARCH PROGRAM

Texas A. & M. Division

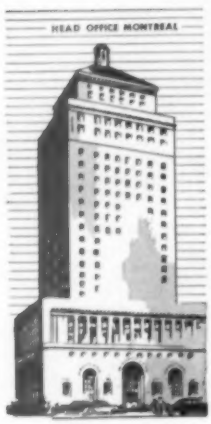
K-values in hydrocarbon systems . . . A study is being made of the equilibrium constants of hydrocarbons in oil and condensate reservoir

(Continued on page 214)

FIRST
in Canada's Oil Fields

The Royal Bank of Canada, Canada's largest bank, whose clients include many of the most prominent firms in the field, offers exceptional services to the petroleum industry. Its Oil and Gas Department, manned by experienced officers in close touch with the situation, provides information, guidance and practical aid to prospective entrants.

In Alberta, Canada's oil-rich province, Royal Bank branches number 57, including Calgary, Edmonton, Leduc, Devon, Redwater and Turner Valley. In Saskatchewan, Manitoba and British Columbia, branches total over 200. *We do not provide information on oil securities.*



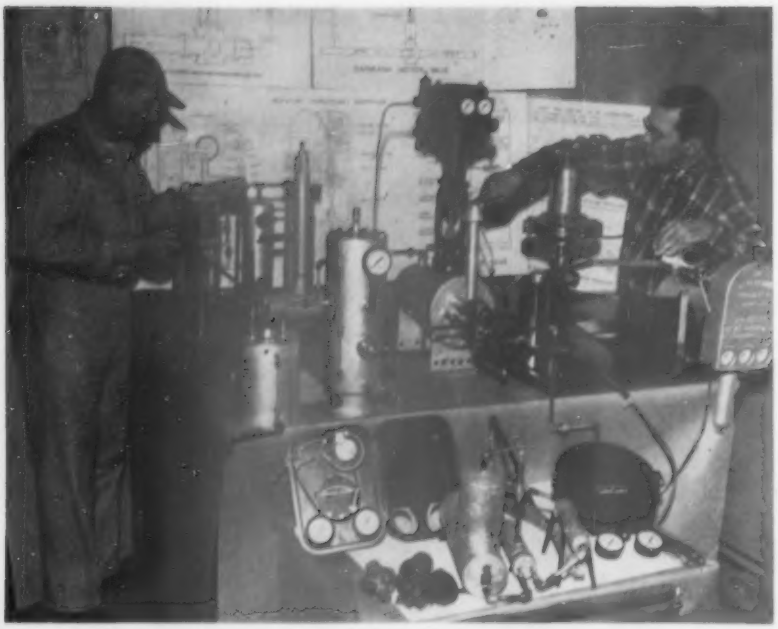
For a free booklet describing our Special Bulletin Service, and containing other interesting information on this fast-growing industry, write our Oil & Gas Department, Calgary, Alta.

THE ROYAL BANK OF CANADA

Assets exceed $2,800,000,000

Over 800 branches in Canada and abroad

New York Agency — 68 William St., New York



AN INSTRUCTOR explains instrumentation principles to a "student."

25,000 "Assists" . . . Is PETEX Proud Claim

Practical application of technical data stressed

AN IMPORTANT contribution to the petroleum industry of Texas and 14 other states by spreading of technical knowledge through practical on-the-job training, has been made by the Petroleum Extension Division (PETEX) of University of Texas.

Established in January 1944 by the university in cooperation with the State Board for Vocational Education, PETEX has administered assistance through its training courses to more than 25,000 individuals who are engaged in petroleum drilling and production.

"Educational contractors" . . . The division describes itself as the "educational contractors" to the State of Texas, and works through the Texas Education Agency.

Courses designed to aid tool pushers, superintendents, drillers, and others engaged in oil-well drilling and production stress practical application of technical data. A rotating staff devotes its time to the teaching of each specific course, which usually runs for a period of 10 days.

The courses are free to those in Texas, and other states in which services are offered are charged a nominal fee.

Cooperative work is being done in 14 other states, in Alberta and Saskatchewan, and with Venezuela.

History . . . PETEX was established by University of Texas in cooperation with the State Board for Vocational Education, and John Woodruff was employed in the newly established post of State Coordinator of Petroleum-Industry Training in 1944. More than 10 years prior to this date, Ray L. Martin, then the director of industrial teacher training at the university, brought out the first of the American Petroleum Institute vocational manuals, "Elementary Mathematics for Oil Field Workers."

During the 1930s, several other manuals were produced, including "Steam Power," "Drilling Practices," "Repair of Mechanical Equipment," and "Compressors in the Oil Industry."

Use of the manuals in organized training was developed by the State Board for Vocational Education and local school authorities. Instruction was given by men from the oil industry on a part-time basis, usually in two sessions of 2 hours each per week.

Kilgore first . . . The Kilgore, Tex., public schools and junior college carried on the first experimental regional plan of operation of extension training in the petroleum industry, serving about 30 East Texas counties during 1939-40 and 1940-41. This plan was adopted in 1940 at Odessa and at Pampa, each local school serving an extensive area.

War interrupts efforts . . . World War II intervened and all vocational education facilities were diverted directly to the war effort, petroleum training being suspended for the duration.

In 1944, the regional plan was expanded into a state-wide plan by J. R. D. Eddy, state director of vocational education; and Charles Cyrus, acting director of industrial teacher education at University of Texas. Through 1944-46, petroleum vocational training was coordinated from Austin.

Instructors were drawn from industry, and in some instances local coordination was carried on by industry men on a part-time basis.

Lewis Finch, of Stanolind Oil & Gas Co.; and Russell Hayes, of Phillips Petroleum Co., were coordinators in the Permian basin. Earl Gray, of Shell Oil Co.; and Art Paine, of Phillips, coordinated at Borger and Pampa. William Rouzer guided the program at Wichita Falls.

Kye Trout, Jr., was employed in 1946 as the first combination "coordinator and traveling instructor" at University of Texas, and his first venture was the mud schools sponsored by American Association for Oilwell Drilling Contractors.

"Portable laboratories" . . . A pattern of "portable laboratories" and traveling instructors was thus created which is still being followed by PETEX. The example was followed with the A.P.I.-sponsored course, "Treating Oil Field Emulsions" in 1949.

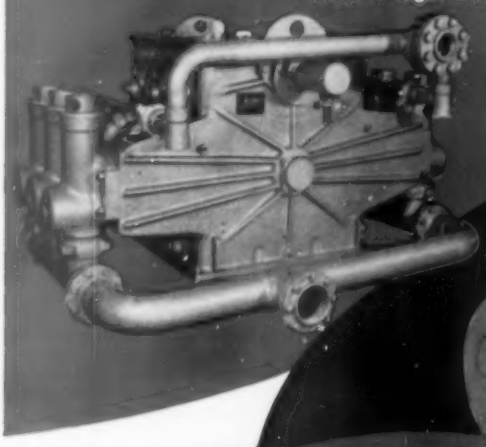
Supervisory training was initiated in 1948 by Bill Herndon, starting a series of programs in this field of training which has been operated continuously since.

Hal Stegman joined PETEX in 1951, and motion-picture production for petroleum-training purposes was then initiated. The first film was "Handling and Running Casing," followed by "Handling Drill Pipe, Drill Collars, and

WHERE CAN YOU USE

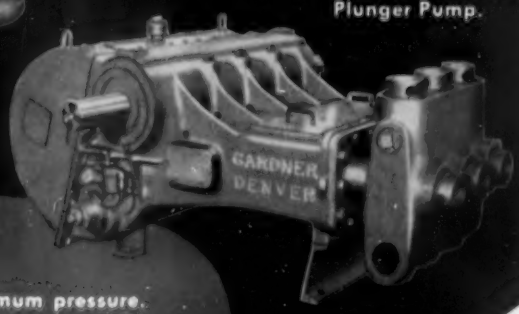
these high-pressure pumps?

10,000
pounds maximum pressure. Capacity ranges up to 408 gpm. Model PL-7 Six-Cylinder Plunger Pump.

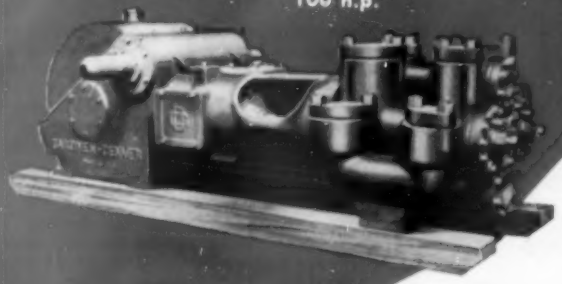


for water flooding?
for salt water disposal?
for acidizing?
for cementing?
for well servicing?
for ? ? ? ? ?

8,000
pounds maximum pressure. Capacity ranges up to 263 gpm. Model PA-8 Triplex Plunger Pump.



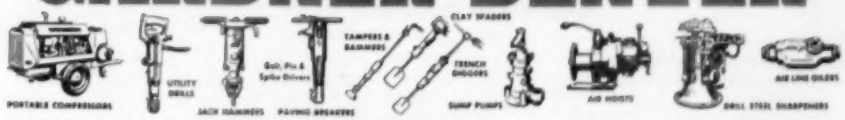
5,000
pounds maximum pressure. Capacity ranges up to 182 gpm. Model FXX Duplex Power Pump. Models 15 to 100 h.p.



Gardner-Denver experience with high-pressure pumping applications may help solve a problem for you. Write for additional information.

SINCE 1859

GARDNER-DENVER



THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

Dallas • Houston • Tulsa • St. Louis
Los Angeles • San Francisco • New York • Chicago • Pittsburgh • Denver
New Orleans

Continental Supply Co.,
Continental Bldg., Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y.

Republic Supply Co., (Of Calif.),
2600 S. Eastland Ave.,
Los Angeles, Calif.

Tool Joints," and "Rotary Drilling Fluids," in 1952 and 1953. Presently in production is a series on "Human Relations for the Oil-Industry Supervisor."

Staff . . . The organization of PETEX places it in the industrial and business-training bureau of the Division of Extension. Eddy is dean of extension work and also director of the bureau. Woodruff is assistant director of the bureau in charge of petroleum-extension services.

Section heads include: Dick Dailey, in charge of drilling courses; Bill Powell, head of supervisor work; and Jack Wiggins, head of production courses. Publications, production of aids, out-of-state work of all kinds, and general consultation is carried on by Woodruff.

Jack Mosley, Walter Ivie, Odys Simmons, and Glen Wilber complete the training staff.

Alfred Goldman is technical editor assigned to publication work.

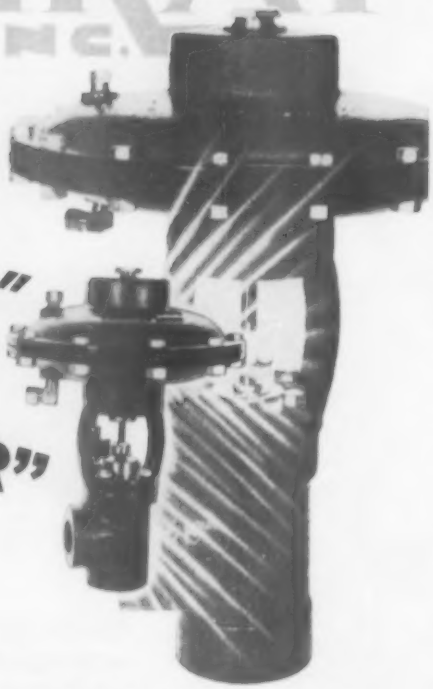
Secretary-clerical-editorial assistance, directed by Mrs. Alice Holmes, administrative secretary of the bureau, is done by Mary Nolen, Mrs. Retha Read, Mrs. Edith Brown, and Mrs. Vada Young.

Odessa work . . . PETEX is now establishing at and in cooperation with Odessa College a long-range training center for drilling personnel on a technical level. About 25 courses will be given on drilling subjects. This project is sponsored by the A.A.O.D.C.

KIMRAY INC.

2" High Pressure Motor Valve

NOW HAS A 1" "LITTLE BROTHER"



1" — 4000# W. P.

- Screwed ends: angle or thru body
- Reversible: pressure opening or pressure closing
- Patented Teflon packing: no adjustment
- Inner valve characterized for throttling service—gas or liquid
- Carbide plug sizes: 1/8" — 3/16" — 1/4" — 3/8" — 1/2"

Manufactured By KIMRAY INC. Oklahoma City U. S. A.

DISTRIBUTORS:

HOUSTON, TEX.—Clif Mock Co.
LAKE CHARLES, LA.—Clif Mock Co.
LAFAYETTE, LA.—Clif Mock Co.
NEW IBERIA, LA.—Clif Mock Co.
BEAUMONT, TEX.—Clif Mock Co.
LOS ANGELES, CALIF.—Fred P. Koenig Co.
ODESSA, TEX.—Control Equipment, Inc.
ABILENE, TEX.—Control Equipment, Inc.
SAN ANGELO, TEX.—Control Equipment, Inc.
HOBBS, N. M.—Control Equipment, Inc.
CORPUS CHRISTI, TEX.—Engineering Service Co.
SHREVEPORT, LA.—Merla Tool Corp.
OKLAHOMA CITY, OKLA.—Kimray, Inc.

T.P.R.C. Aids Texas Operators

(Continued from page 210)

systems. Separator samples are being recombined and K-values are obtained at different pressures and temperatures.

Nuclear magnetic resonance, for core and fluid properties . . . The L armor frequency of the individual hydrogen nuclei in a molecule that is in a constant magnetic field is found to vary due to a diamagnetic and paramagnetic effect of the molecule at the individual nuclei. This causes the nuclear resonance line of a molecule to be split into components and likewise the nuclear resonance line of a multiple compound system. This effect permits the quantitative measurement of one hydrogen containing compound in the presence of another such as the amount of water in a hydrocarbon-water mixture or core sample.

Studies are being made to determine the feasibility of utilizing the nuclear resonance techniques for determining the oil and water saturation in unconsolidated sands during static and dynamic conditions.

Fractured and heterogeneous reservoirs . . . A research project has been initiated on a study of the effect of fractures on the production capacities and primary and secondary recoveries from oil and distillate reservoirs. Vertical, pancake, elliptical, and inclined fractures have been studied. The data show the expected increase in producing capacities from creating various types of fractures.

Most efficient rates of production . . . Estimates are being made of the effect of rate of withdrawal on the ultimate oil recovery. This study constitutes part of the program of obtaining criteria for determining most efficient rates of production. A centrifugal reservoir model is being built to study solution gas drive and gravity drainage reservoirs at simulated reservoir conditions.

When to initiate pressure maintenance . . . Studies are under way to determine when a pressure-maintenance program should be initiated and what fluids should be injected. Unconsolidated sands and cores are being investigated at reservoir pressures and temperatures.

Gas reservoirs . . . An electrical model study has been made of the unsteady radial flow of gas corrected for known variations in compressibility, viscosity, slippage, and rock expansibility with pressure.

Charts are being prepared to permit accurate determinations of static bottom-hole pressures from surface pressure measurements. Gas gravities ranging from 0.6 to 1.1 and thermal gradients for the range 5° to 25° F. per 1,000 ft. have been considered for well depths down to 11,000 ft.

What's NEW

In Logging, Perforating and Fishing Tool Services

McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

Another McCullough First—

NOW! *Recover All Free Pipe in*

ONE RUN

McCullough, world's fastest back-off service, again reduces time required to recover stuck pipe.—Another 50% saving in rig time with this amazing, new combination tool.

A GREAT COMBINATION

McCULLOUGH MAGNA-TECTOR

(FREE POINT FINDER)

AND STRING SHOT BACK-OFF

PERFORMS BACK-OFF OPERATION IN ONE ELECTRIC WIRE LINE RUN IN THE HOLE!

ONE TRIP IN THE HOLE *COMPLETES ALL THESE OPERATIONS—*

1. The Magna-Tector is operated to find lowest free point in stuck drill pipe or tubing, by STRETCH and TORQUE.

2. The first joint above the stuck point is exactly located by a special Magnetic Collar Locator in the Magna-Tector.

3. The String Shot Back-off Tool is fired to loosen the joint, permitting all free pipe to be backed off and removed from the well.

"THE ONLY *ONE-TRIP* BACK-OFF SERVICE"

The new combination McCullough Magna-Tector and String Shot is available at most McCullough service locations . . . call your McCullough Service Engineer.

WRITE FOR NEW, 4-PAGE TECHNICAL BULLETIN NO. 402

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

McCULLOUGH TOOL SERVICE
5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas
CABLE ADDRESS: MACTOOL
EXPORT OFFICE: Los Angeles, Calif.
CANADA: Edmonton, Calgary, Grande Prairie, Alberta; Regina, Sask.
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Midkiff, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton, Hominy, Wewoka. **ARKANSAS:** Magnolia. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper, Cody, Newcastle. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

CHANGE SETTING IN SECONDS!

On The Versatile GUIBERSON TYPE A CONTROLLER

Type A Controller

- 2" Line Pipe Threads.
- Cast Steel Body.
- 3,000 psi Test Pressure.
- 1,500 psi Working Pressure.
- Stainless Steel Stem.
- "TEFLON" Stem Packing.
- "COLMONOY" Ball and Seat.
- Steel Drip Chamber with Monel Screen.
- Corrosion Resistant Materials in Controller Parts.
- Weather Proof Cover with Baked-on Enamel.

Adjustment for intermittent production at any given interval is just that quick on this Guiberson built unit. Lift the cover, shift the timing drum, set the adjusting screw at the point desired and the job is done. A series of fixed tabs on the revolving drum are spaced for different time cycles — five minutes, seven minutes, ten minutes, twelve minutes and other intervals that might be required. A broad range of injection frequencies is provided, from a minimum of five minutes to a maximum of one injection per revolution of the two-hour clock. Accurate timing of the injection period is obtained by a simple screw and each cycle repeats with extreme accuracy. There are no loose pins or tiny adjustment parts — no special tools are required.

Extremely versatile, the same unit is easily adapted to continuous or intermittent gas lift production, purging, down-stream or up-stream pressure control of tubing or casing, tubing control, casing control, or combination tubing and intermitter control. In any of these applications the controller has a very low "on-off" operating differential. Pressure adjustments may be made very accurately, conveniently; and the control is positive. The entire unit is built of corrosion-resistant materials; is compact yet accessible, light but strong, extremely sensitive though sure in operation.

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

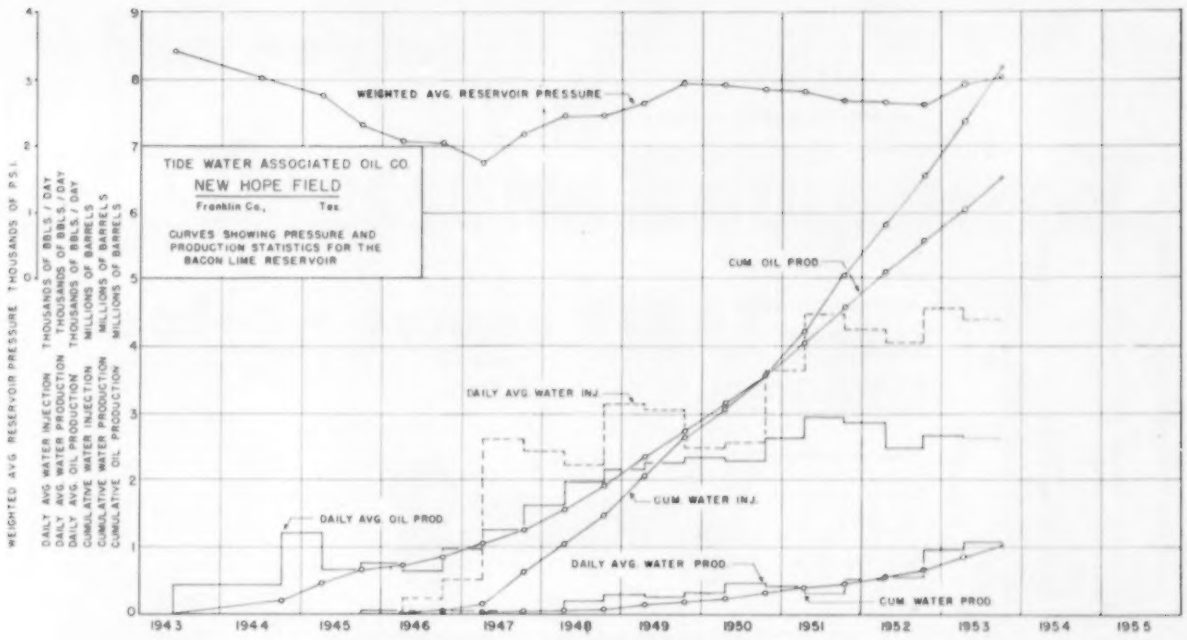


Fig. 1—Pressure and production statistics for the Bacon lime reservoir.

Texas Petroleum Research Committee Report:

Texas Field Has Production by Primary Artificial Frontal Water Drives

by A. S. Trube

NEW HOPE field, of Franklin County, Texas, demonstrates the feasibility of controlling reservoir pressures and of developing favorable water fronts even under difficult conditions. From an operating viewpoint alone, the maintenance of pressure has been worth while by sustaining flowing production in the great majority of the producing wells. As a result of this project, the operators have not had to face either the difficult problems of artificially lifting deep wells with low fluid levels, or of justifying a "secondary recovery" project along with its "fill up" and high-volume water-production requirements.

The advantages of the frontal or line drive are being realized in this field in the same manner as though ideal natural water drives had been initially available. The Hill sand partial water drive has been brought under control, and actually replaced by an artificial water drive from a more strategic direction.

Author is with Tide Water Associated Oil Co., Houston. Paper presented at Texas Petroleum Research Committee symposium, Tyler, Tex., May 7, 1954.

New Hope field is located about 12 miles northeast of Winnsboro, Franklin County, Texas. This trap contains four known oil reservoirs which are of the Trinity group of the Lower Cretaceous period—namely the Bacon lime, Hill, Pittsburg, and Elledge sands.

The oil-productive portion of each reservoir is not present in all of the producing wells because their areas and positions vary with respect to one another. Some wells near the center may penetrate all four reservoirs, while others may penetrate three, two, or perhaps one, depending on their locations.

The Bacon lime, Hill and Pittsburg sands all contain undersaturated oil. The Elledge sand, however, has a primary gas cap. Elledge producing wells are generally characterized by an early increase in gas-oil ratio, making it necessary to recomplete them in other reservoirs. Because of the difficulties encountered in producing oil from the Elledge sand, and the small quantity of oil actually present, future attempts at producing it will probably be on a salvage basis during the later life of the program. For these reasons this report is confined to a discussion of the program as it relates to the Bacon, Hill, and Pittsburg reservoirs.

How developed . . . Although the initial producing rates of New Hope field were relatively high, the reservoir pressure began immediately to decline rapidly. Further study of data made available as the field was developed indicated that the average net pay in the Bacon, Hill, and Pittsburg were only about 10, 13, and 17 ft. respectively and that water influx into the Bacon and Pittsburg reservoirs was practically nonexistent. Only the Hill sand had a partial water drive which could sustain about 1,000 bbl. per day of stock-tank oil production—if no water was produced. And, further, it was found that the saturation pressures of the Bacon, Hill, and Pittsburg reservoir oils were 907, 1,110, and 1,682 psi. with gas in solution of 256, 286,

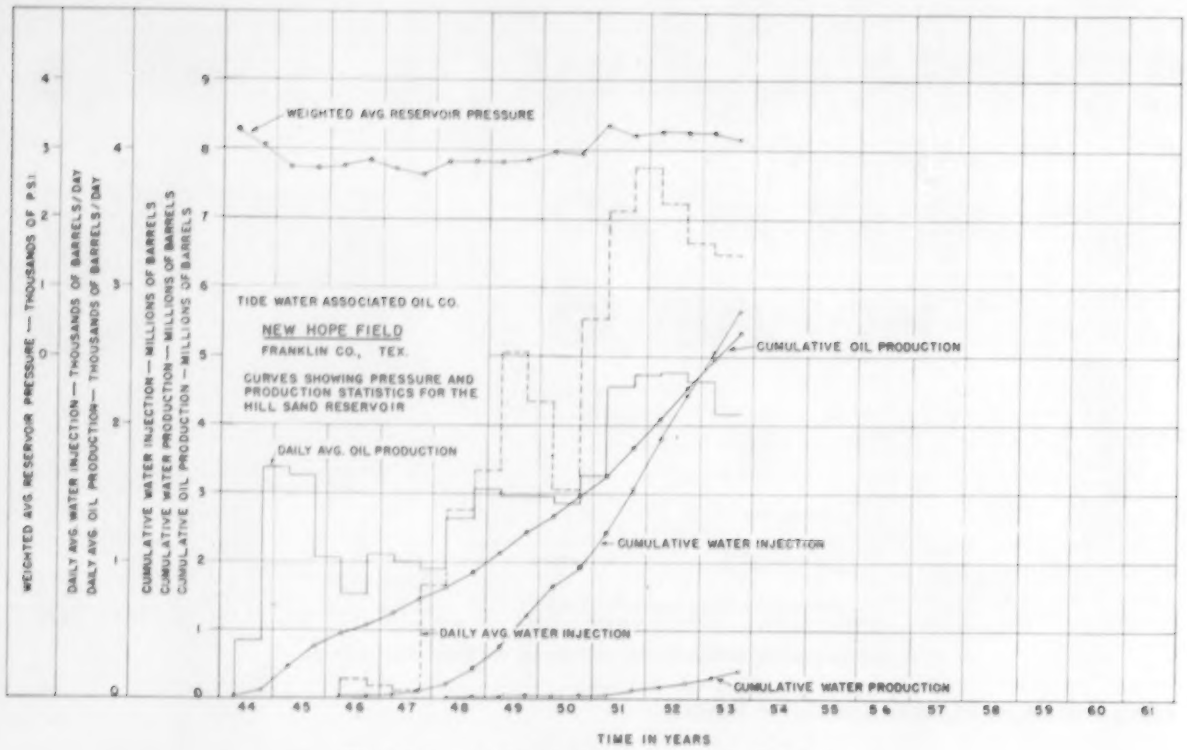

WEIGHTED AVG RESERVOIR PRESSURE — THOUSANDS OF PSI
DAILY AVG WATER INJECTION — THOUSANDS OF BARRELS/DAY
DAILY AVG OIL PRODUCTION — THOUSANDS OF BARRELS/DAY
CUMULATIVE WATER INJECTION — MILLIONS OF BARRELS
CUMULATIVE WATER PRODUCTION — MILLIONS OF BARRELS
CUMULATIVE OIL PRODUCTION — MILLIONS OF BARRELS
WEIGHTED AVG RESERVOIR PRESSURE
TIDE WATER ASSOCIATED OIL CO.
NEW HOPE FIELD
FRANKLIN CO., TEX.
CURVES SHOWING PRESSURE AND PRODUCTION STATISTICS FOR THE HILL SAND RESERVOIR
CUMULATIVE OIL PRODUCTION
DAILY AVG. OIL PRODUCTION
CUMULATIVE WATER INJECTION
DAILY AVG WATER INJECTION
CUMULATIVE WATER PRODUCTION
44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
TIME IN YEARS

Fig. 2—Pressure and production statistics for the Hill sand.

T.P.R.C. Report

and 577 cu. ft. per bbl. respectively. All three reservoirs were between 7,000 and 8,000 ft. in depth and had initial pressures on the order of 3,425 to 3,523 psi.

It is doubtful that any of these reservoirs could have been developed or produced economically under the so-called "primary recovery" process. The Bacon lime, for instance, is the shallowest and largest of the three reservoirs. The problems that the operators faced in anticipation of having to pump oil from such a solution-drive reservoir 7,300 ft. deep and with reservoir pressures less than 400 psi. were such as to make development commercially unattractive.

To complete the picture superimpose two similar but smaller reservoirs beneath the Bacon lime. Obviously the possibilities are encouraging if the wells will flow from dual-completion arrangements. But with only a short possible flowing life and a long and difficult pumping life, production by "primary recovery" was out of the question soon after the development program was under way.

Although the volume of stock-tank oil actually in place in the three reservoirs was on the order of 90 million barrels, the prospects of recovering even a small fraction of that amount were difficult and remote. Needless to say the managements of the operating companies began very early in the life of the field to consider the means by which this problem could be solved. That the problem was solved on a practical basis has already been reported in an earlier paper.[1]

Project classification . . . One of the problems which has grown out of this project is concerned with the terminology commonly used to define its nature. None of the conventional terminology actually applies. This is certainly not a secondary-recovery operation because the project was under way long before the economic limit under primary recovery had been reached.

Also, New Hope is not a water-flooding project in the conventional sense that this term is used, because none of the problems of fill-up or injection-producing well pattern arrangements are present here. The term pressure maintenance may be loosely applied, but it does not state the nature of the project and neither does it define where or with reference to what the pressure is being maintained.

Even the term "primary pressure maintenance" is inadequate because of confusion over what is meant either by the term "primary" or the term "pressure maintenance." One way is to classify the production mechanism in terms of type of drive rather than in terms of recovery. With reference to the type of drive let the word primary refer to displacement at or above the initial saturation pressure of the reservoir oil, and the word secondary refer to displacement at any pressure below the initial saturation pressure of the reservoir oil. For a primary water drive, therefore, fillup would not be necessary.

A natural water drive would be one in which reservoir oil is displaced by water coming into the reservoir from its own aquifer only—even if some of this water is produced and returned to that reservoir. Conversely, an "artificial" water drive would be one in which the reservoir oil is displaced by water which does not come from the aquifer of the reservoir in question and regardless of the means by which it enters the reservoir. (Water influx from other aquifers or water sources via injection wells, fault planes, casing leaks, etc., would be classified as artificial.)

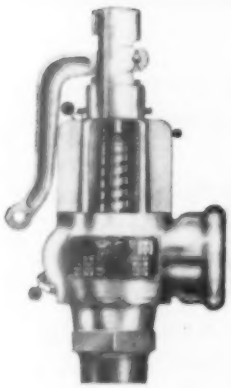
To complete the classification it must be recognized that most artificial water drives fall into two major types, namely, "frontal" and "pattern." Although there are many injection-producing well arrangements, the nature of which are obvious by inspection, there are also in-between or hybrid arrangements which are not so obvious.

A suggested arbitrary definition of a frontal water drive would be where the

When buying

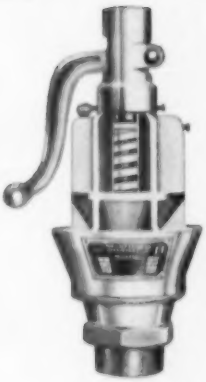
Pressure Equipment

safety comes FIRST...

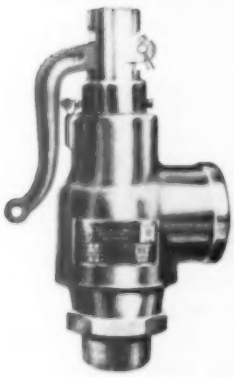


HC-SOES

Depend on INFERNO Safety "Pop" Valves



HC-TOES-A



HC-SOCS

Years of testing and strenuous service in the field have proven INFERNO "Pop" Valves the safest in the world. Made of tough malleable iron, Inferno "Pop" Valves have a tensile strength of 55,000 to 60,000 lbs. per sq. inch. Valves and seats are nickel alloy for working pressures of 200 lbs. and above, and bronze for lower pressures. Stems are stainless steel for pressures above 200 lbs. and bronze for lower pressures. Inferno "Pop" Valves have 2" male inlets, screw or flanged, and 2½" female outlets. There's only one way to be 100% safe. Only one way *sure* . . . specify INFERNO!

HC-SOCS-CS

Write for Bulletin No. 31.

INFERNO COMPANY

POST OFFICE BOX 1138 E

SHREVEPORT, LOUISIANA

TRANSPARENT GAUGES REFLEX GAUGES OIL BURNERS SAFETY VALVES GAS BURNERS FIRING CONTROLS BOILER SAFETY UNITS

MORE CONTRACTS ...MORE PROFIT

with

WALKER-NEER SPUDDERS

"A Contractor's Best Salesman"

This is the 4th Walker-Neer Spudder purchased by Reed and Hinds, of Satanta and Ulysses, Kansas.

Many, many oil companies—more every year—give preference to the cable-tool contractor who owns Walker-Neer Spudders.

"I've *got* to get a Walker-Neer Spudder," an Oklahoma contractor told us recently. "My three best customers—two majors and one independent—demand it."

Compare spudders . . . feature for feature, dollar for dollar! Your big advantage today—in getting contracts and showing a profit—is Walker-Neer Spudders.

Revolutionary Spudding Action

V-belt spudding drive, combined with the exclusive "Tor-Shock" (rubber torsion) Shock Absorber, provide a revolutionary spudding action—faster, harder-hitting strokes, and the quietest, smoothest operation in the field. More strokes per minute, more hole per hour!

Double-Quick Workover

Full-width, high-speed calf reel eliminates piling up and cutting in of wire line . . . has large-surface DOUBLE brake bands for positive, balanced braking. With 4 speeds forward (a standard Walker-Neer feature), you obtain tremendous time savings in well service and cleanout operations. Double tubular telescoping mast which requires no bracing saves hours in rigging up and tearing down.

WALKER-NEER

MANUFACTURING COMPANY, INC.

P. O. BOX 2490 WICHITA FALLS, TEXAS

DISTRIBUTORS: Oil Well Supply Company • Bovaird Supply Company • Jones & Laughlin Supply Company • Mountain Iron and Supply Company • E. D. Taylor Company • Acme Well Supply (exclusive export agent except on North American Continent)

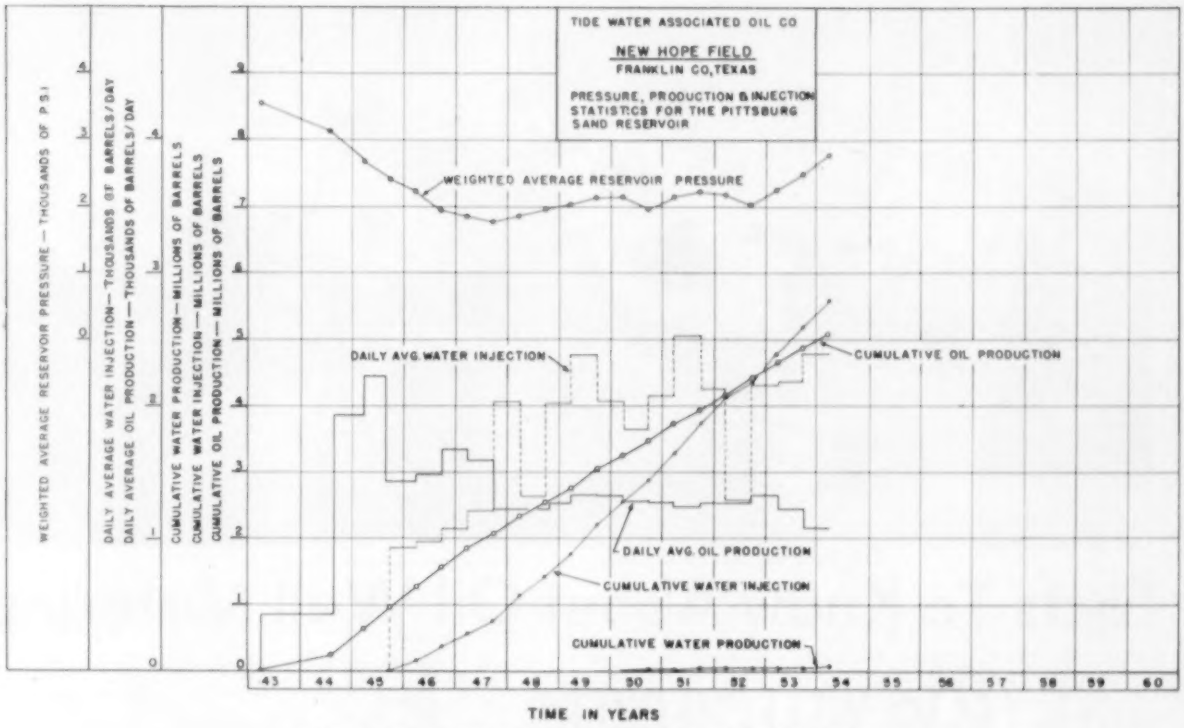

TIDE WATER ASSOCIATED OIL CO
NEW HOPE FIELD
FRANKLIN CO, TEXAS
PRESSURE, PRODUCTION & INJECTION STATISTICS FOR THE PITTSBURG SAND RESERVOIR
WEIGHTED AVERAGE RESERVOIR PRESSURE — THOUSANDS OF P.S.I.
DAILY AVERAGE WATER INJECTION — THOUSANDS OF BARRELS/DAY
DAILY AVERAGE OIL PRODUCTION — THOUSANDS OF BARRELS/DAY
CUMULATIVE WATER PRODUCTION — MILLIONS OF BARRELS
CUMULATIVE WATER INJECTION — MILLIONS OF BARRELS
CUMULATIVE OIL PRODUCTION — MILLIONS OF BARRELS
WEIGHTED AVERAGE RESERVOIR PRESSURE
DAILY AVG. WATER INJECTION
CUMULATIVE OIL PRODUCTION
DAILY AVG. OIL PRODUCTION
CUMULATIVE WATER INJECTION
CUMULATIVE WATER PRODUCTION
43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
TIME IN YEARS

Fig. 3—Pressure and production statistics for the Pittsburg sand.

T.P.R.C. Report

ratio of the average distance from the injection wells to the producing wells, divided by the average distance between the injection wells is greater than unity in the same reservoir segment. Conversely, a pattern water drive would be one in which the above ratio is equal to or less than unity.

Obviously both pattern and frontal types of drive could be in operation in the same reservoir concurrently, so this classification could be applied either to an entire reservoir or to a portion thereof.

Illustrations of the application of the above system to a few Texas field examples are shown in Table 1.

This classification system provides a

TABLE 1

Field—	Classification
Cayuga	Secondary natural edge water drive
East Texas	Primary natural edge water drive
Kelly Snyder	Secondary artificial frontal water drive
Kermit	Secondary artificial pattern water drive
New Hope	Primary artificial frontal water drive

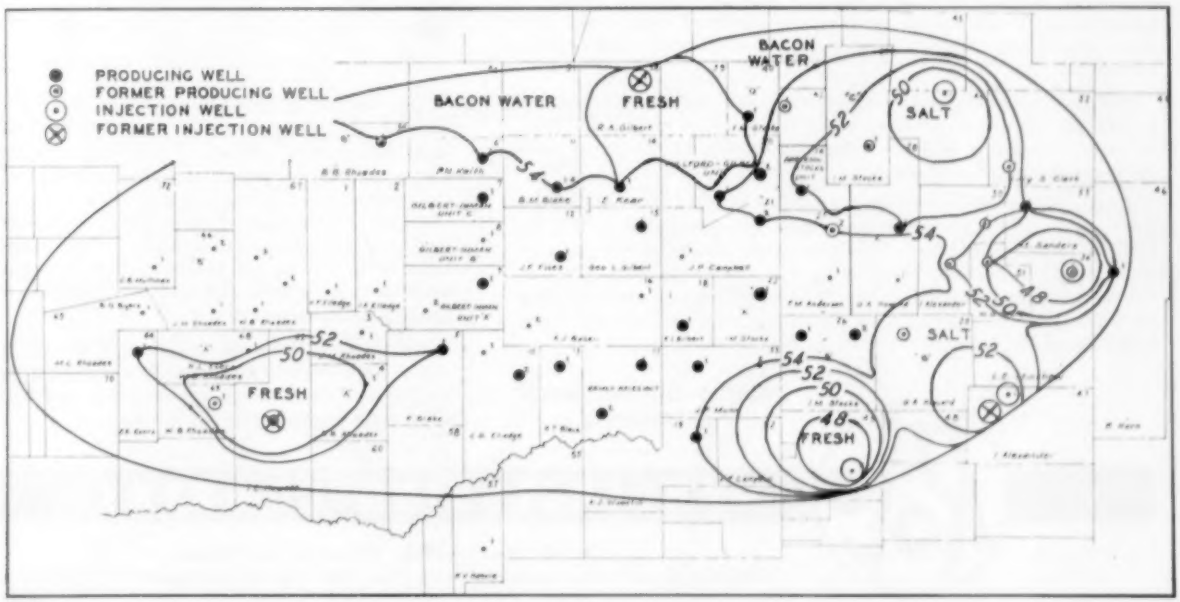
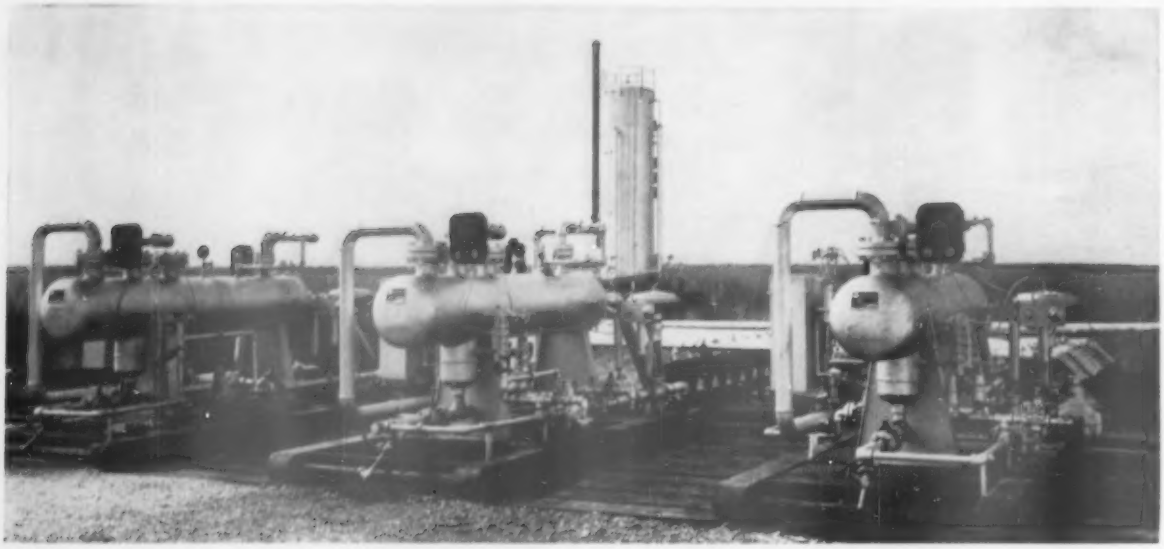


Fig. 4—Map showing flood-front development in the Bacon lime since 1946.



Facts To Know About Oil Well Metering

with ROLO WELLCHECKERS

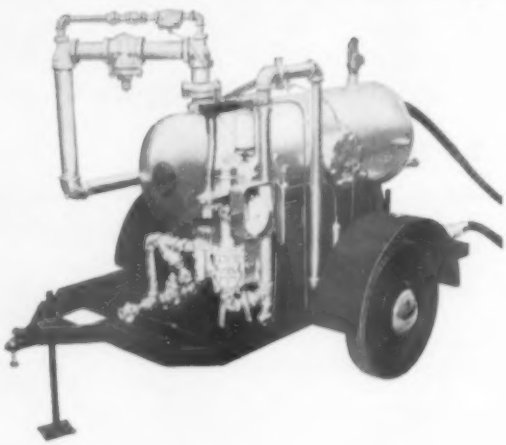
PERMANENT AND PORTABLE SEPARATORS FOR METERING OIL AND GAS

Since the first major application of oil well meters in the late 1920's, production men have become more and more interested in the use of oil well metering, and the large savings made possible with them. The pioneering done with the original ROLO WELLCHECKERS made possible the production of many wells, from a number of separate leases, directly into a central tank battery or stabilization plant. Operators could then check well production daily and obtain accurate production records for tax and royalty payments.

ROLO WELLCHECKER designing was carefully engineered to provide the most reliable meter accuracy, a complete range of rated capacities, durable construction for long service, and the greatest ease of maintenance.

Available in permanent and portable models, in the various sizes and working pressures to fit any operation, ROLO WELLCHECKERS separate well fluid into three phases of oil, gas and water, and meter each accurately, then discharge separately or recombined, as desired. ROLO WELLCHECKERS are shipped anywhere, anytime, completely piped and ready to operate. Free water knockout, with meter, can be furnished, as required.

CRUDE OIL METERING SPECIALISTS



The battery of three skid-mounted 4-5H-1607 Rolo Wellcheckers at top is typical of the many installations now providing reliable service to major producers throughout the industry. The trailer-mounted 1H-2406 Rolo Wellchecker, also shown, is typical of the many completely equipped portable units which can be moved from lease to lease, as required. Simple connections at inlet and outlet prepare the unit for immediate operation.

Rolo offers complete engineering service for every crude oil metering need. Send us your well testing and oil metering requirements and let us work with you on your problems.

ROLO MANUFACTURING COMPANY

P. O. Box 6763, Houston 5, Texas

BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Los Angeles, Bakersfield, Casper, Mt. Vernon (Illinois), Calgary (Alta.), Petroleum Industry Consultants, Apartado 3992, Caracas, Venezuela. EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

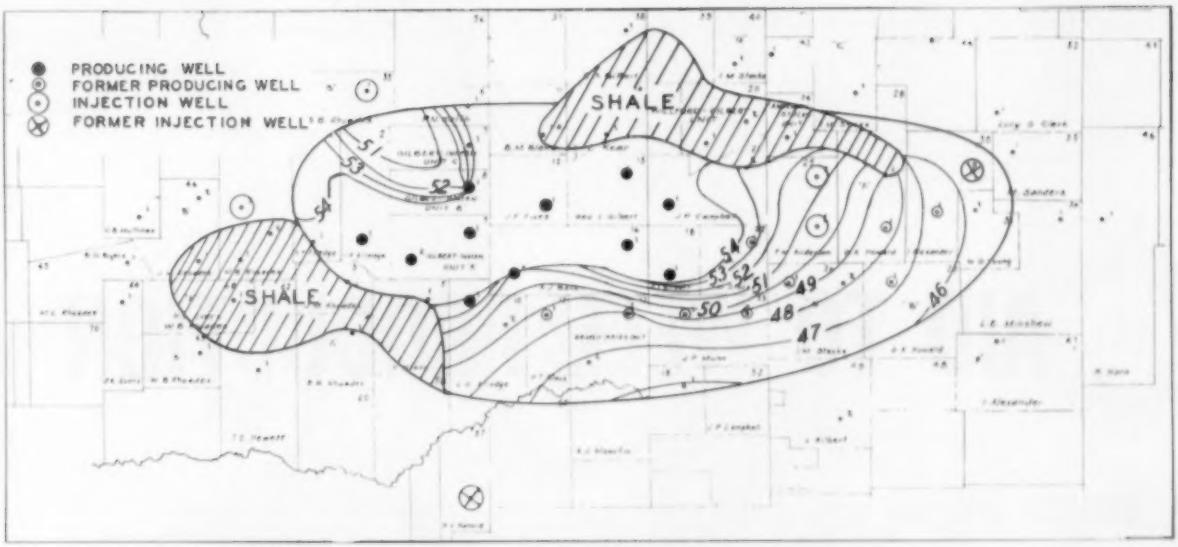


Fig. 5—Map showing flood-front development in the Hill sand since 1946.

T.P.R.C. Report

consistent basis which should apply to the great majority of water-drive operations, including New Hope, now loosely described in terms of primary recovery, secondary recovery, and pressure maintenance.

Bacon Lime

The pressure and production statistics are shown both on a cumulative and a semiannual interval basis graphically in Fig. 1 for the Bacon lime. The cumulative and interval data are shown on the same scales so that their relative proportions may be visualized. It is of interest to note that during the past 4 years the oil-producing rate has been averaging about 2,700 bbl. per day. The cumulative oil produced was about 6.52 million barrels of stock-tank oil, or about 8.02 million barrels of reservoir oil. The cumulative barrels of water injected and produced were 8.17 and 1.03 million barrels respectively, making the cumulative net water injected 7.14 million barrels.

Although the cumulative water injected exceeds the cumulative stock tank oil produced, on a reservoir basis we still lack about a million barrels in having put back as much as we have taken out. This is reflected also by the present reservoir pressure of about 3,000 psi., which is about 400 psi. less than its original value. This pressure is sufficient to keep most of the wells flowing while also maintaining a displacement advantage at a higher formation volume factor.

The map shown on Fig. 4 shows the estimated position of the various flood fronts at 2-year intervals since the start of the project. It will be noted that three injection wells are no longer in operation. The north injection well, 38-1, was shut down in 1950. By that time we were certain that there was a small amount of natural water influx along the north flank as evidenced by the production of high-chlorine water from the wells shown in that area.

The existence of this water influx had been previously indicated by material-balance calculations to be on the order of about 500 bbl. per day. Other variables entering into the calculations, however, did not warrant the assumption of water influx until it was actual-

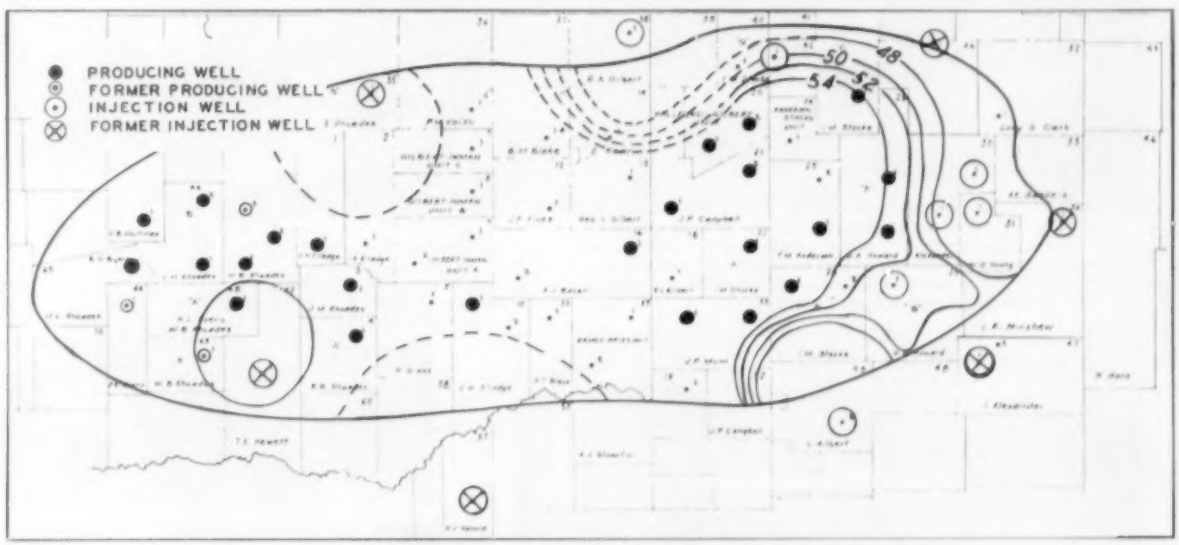


Fig. 6—Map showing flood-front development in the Pittsburg sand since 1946.

AID TO WELL PRODUCTION

DOWELL acidizing service uses special chemicals and techniques to restore well production—to help complete new wells

Acidizing is one of the most practical answers to the problem of maintaining peak well production. It is used in limestone, dolomite and other formations containing acid-soluble materials—to create and enlarge flow channels . . . to increase permeability. There's more to acidizing than just acid, however. The key to *successful* acidizing lies in selecting the *right* acid and treating techniques.

Dowell offers the most complete acidizing service in the oil industry! Inhibited acids with a wide variety of special addition agents are available to solve your specific problems. But, most important of all, Dowell offers *service!* Experienced, highly trained engineers are on constant call—around the clock—to serve your needs. Their service includes thorough diagnosis of well conditions, preparation of the proper chemicals, and the use of modern tools and high-pressure, high-volume pumping equipment.

Dowell acidizing is one of many services developed especially for the oil industry. Also call your nearest Dowell office about fracturing, Electric Pilot and Glass Gun jet perforating. Or write directly to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. E-11.

HERE ARE SOME EVERYDAY RESULTS OF DOWELL ACIDIZING SERVICE

MUD ACID TREATMENT solved completion problem! The pay formation of a wildcat well took an estimated 1500 barrels of mud during drilling. On completion, fill-up was only 5 barrels of oil per hour. After a 1000-gallon Mud Acid treatment the well flowed 65 BOPD.

PRODUCTION INCREASED from 14 to 56 BOPD following Dowell Selective Acidizing treatment on this newly deepened well. Using the Dowell Electric Pilot, the bottom zone was acidized while the depleted upper zone remained exposed in the open hole.

DOWELL XM ACID controlled silicate swelling in a well to bring a potential of 300 BOPD. Neighboring wells had never given a potential of over 100 BOPD.

Dowell engineers use the latest acidizing tools and techniques to increase well production. They use special acid addition agents to: (1) reduce the swelling of silicates; (2) minimize corrosion during high-temperature acidizing; (3) remove mud from producing formations; (4) speed reaction rate; (5) retard reaction rate; (6) prevent emulsions; (7) remove "gyp"; (8) increase penetrating ability and reduce surface tension; (9) trace fluid movement; and (10) increase acid weight. Call Dowell today.

DOWELL SERVICE

chemical services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

ly noted. Also, the locality of this water was not known until it was actually observed.

In connection with this it is also interesting to note that the fresh-water flood from 38-1 broke into wells 14-1, 20-1, 20-2, and 40-1. But after 38-1 was shut down, 14-1 and 40-1 changed gradually from a predominantly fresh-water to a predominantly formation-water mixture. Wells 20-1 and 20-2 subsequently returned to pipeline-oil production and remained so until the flood of Woodbine water from the 44-1 injection well broke in last year. The north flank water front has not moved perceptibly during the past 4 years. This is probably due to the fact that the water is being produced as fast as it can come in.

Bad cement job . . . It will be noted that well 47-1 is also shut down. This well was drilled as an injection well to both the Bacon and Pittsburg reservoirs. By January 1, 1952, the Bacon flood had probably reached the approximate size shown on Fig. 4. At that time, however, this flood should have been much larger.

Referring to the graph on Fig. 1 it will be noted that during 1951, when 47-1 was in full operation, the total water-injection rate had been increased substantially—yet the reservoir pressure was declining. Naturally since 47-1 had been completed only recently, it was least suspected of having a casing leak or a bad cement job. But after testing all the other injection wells, it was finally ascertained that 47-1 had to be at fault. A radioactivity survey eventually proved the existence of a bad cement job and several casing leaks above the Bacon.

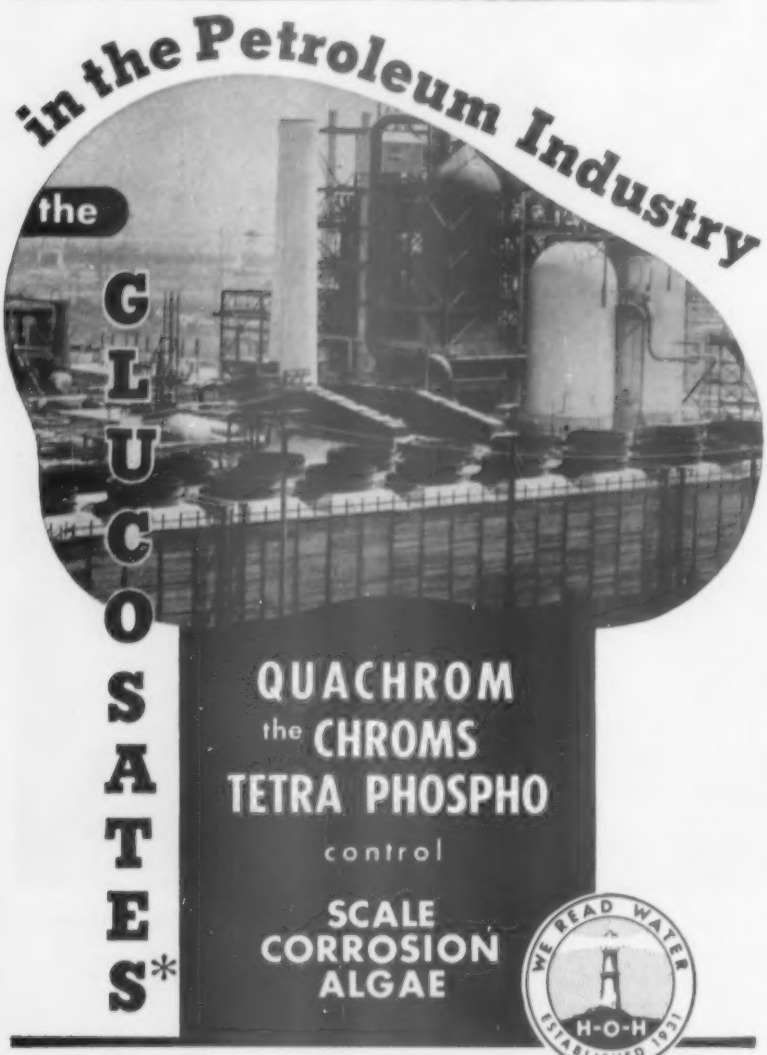
Later, while attempting to repair the well, the casing collapsed, making it necessary to plug and abandon 47-1 and redrill same as 47-2. The size of the flood around 47-1 as of January 1, 1952, was estimated by material-balance calculation and may be subject to question. Well 29-1, however, was flooded out on schedule by the continued development of this flood from 47-2, and currently this flood is somewhere between 26-2 and 29-1.

Well 62-1 is another former Bacon injection well which has also been shut down. This flood achieved almost a simultaneous breakthrough into wells 5-1 and 64-1. Prior to the breakthrough both of these wells were flowing, but ceased flowing shortly thereafter. After this flood was shut down well 5-1 began flowing again and gradually returned to pipeline-oil production. Well 64-1, however, has continued to produce by pumping.

The decision to stop injection in well 62-L was a result of a change in basic design from a peripheral to an end-to-end flood. This plan has been integrated with similar plans for the Hill and Pittsburg reservoirs and is conducive to high ultimate recovery, by permitting maximum flow of water through the formation being invaded.

It is also believed that this plan offers maximum utility of mechanical and artificial-lift equipment in a multiple-zone field with a minimum amount of shifting from well to well. Also, it will be noted that under this plan the wells west of Tract 2 will be the last ones flooded out. The pay in this west side area is relatively thin, averaging less than 5 net feet. These wells are not completed at present in the Bacon lime—they will eventually be used, however, to produce water-free oil when it is being displaced from the thicker sections east of Tract 2. It should be noted that well 69-1 was not completed in the Bacon lime until after the 62-1 flood had been shut down. This well never produced less than 95 per cent water and was eventually shut down.

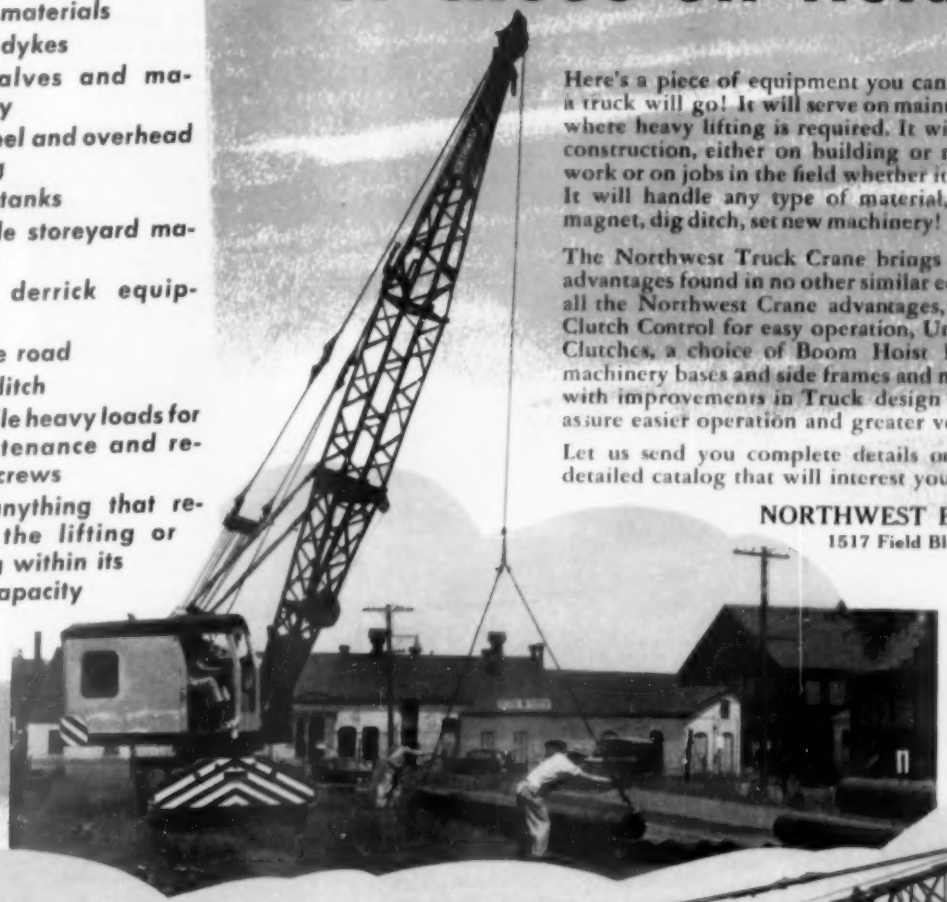
The previous discussion has been concerned with the reasons for dis-



The "HANDYMAN" for those oil field jobs!

What it will do!

- *Handle, load and set pipe*
- *Handle gravel and loose materials*
- *Build dykes*
- *Set valves and machinery*
- *Set steel and overhead piping*
- *Erect tanks*
- *Handle storeyard material*
- *Erect derrick equipment*
- *Grade road*
- *Dig ditch*
- *Handle heavy loads for maintenance and repair crews*
- *Do anything that requires the lifting or digging within its rated capacity*



Here's a piece of equipment you can put almost anywhere a truck will go! It will serve on maintenance and repair jobs where heavy lifting is required. It will save money on new construction, either on building or refinery work, on road work or on jobs in the field whether it's drilling or pipelines. It will handle any type of material, drive piles, swing a magnet, dig ditch, set new machinery! What is your problem?

The Northwest Truck Crane brings you a combination of advantages found in no other similar equipment. It combines all the Northwest Crane advantages, the "Feather-Touch" Clutch Control for easy operation, Uniform Pressure Swing Clutches, a choice of Boom Hoist Equipment, cast steel machinery bases and side frames and many other advantages with improvements in Truck design and construction that assure easier operation and greater versatility.

Let us send you complete details on this rig. There is a detailed catalog that will interest you. Write for it.

NORTHWEST ENGINEERING CO.
1517 Field Bldg., 135 South La Salle St.,
Chicago 3, Illinois

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

NORTHWEST ENGINEERING COMPANY
135 South La Salle Street, Chicago 3, Illinois

Please send me complete information and catalogs on equipment as checked:

☐ Shovel ☐ Crane ☐ Dragline ☐ Pullshovel
☐ Truck Crane Capacity _____

Name _____
Address _____
Town _____ Zone ____ State ____
Signed _____

Get Into Tight Spots at a Profit ...With a Sherman Power Digger!

Here's real proof of the compactness and maneuverability of the Sherman Power Digger! The job: Dig a 6 foot deep machine foundation hole 10 feet square in a working area only 20 feet square, with overhead beams and lights reducing the ceiling limit to less than 10 feet in some spots.

The floor was 8 to 10 inches of concrete, reinforced with ¼ inch steel rod. It was broken up with air tools, then loaded into a dump truck by the digger. Manual loading would have been difficult because of the reinforcing rods, but these presented no problem when loaded mechanically.

Digging and loading took less than four hours, in spite of the limited maneuvering area. Estimated time for hand labor: Three men working about 2½ days!

If you now excavate by hand, or if your heavier power equipment cannot work in tight spots, you'll profit with a Sherman Power Digger. It's compact, flexible, fast, easy to operate. It costs little to buy, less to maintain, quickly pays for itself. For the whole story, write today for Bulletin No. A-13.

Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.

Patent No. 2,303,852
Other patents pending
© SHERMAN PRODUCTS INC., 1954

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

For L-O-N-G-E-R THREAD LIFE

Use these famous Jimmie Gray Tool Joint and Drill Collar Compounds

You'll like this new Jimmie Gray Dope Brush, too!

YES SIR—sold through your favorite supply store

PETROLEUM DISTRIBUTING COMPANY

BOX 303 - HOUSTON, TEXAS - CHarter 5648

Quality Oil Field Lubricating Oils and Greases

continuing the use of three injection wells and their associated problems. The enlargement of the remaining floods has proceeded in a uniform manner and was practically uneventful. It is believed that the floods have now merged in the manner shown in Fig. 4 and the forward positions of the front well established by producing-well performance.

It is believed that the experience with this reservoir demonstrates that it is possible for it to achieve increased ultimate recovery along with low water production and lifting costs. The data in Fig. 1 indicate that the cumulative produced water-oil ratio to date is 0.158 to 1 and that the last semiannual average water-oil ratio was 0.412 to 1. At the present time about 80 per cent of the Bacon production is flowing and 20 per cent is by artificial lift. Producing wells are not shut down until their water production exceeds 90 per cent.

Hill Sand

The pressure and production statistics for the Hill sand are shown in Fig. 2 in the same manner as outlined for the Bacon lime. The reservoir produced about 5.33 million barrels of stock-tank oil, or about 6.82 million barrels of reservoir oil as of October 1, 1953. At that time 5.68 million barrels of water had been injected, 0.41 million had been produced and the net water injection was about 5.27 million barrels.

It is noted that the net reservoir withdrawal has been about 1.55 million barrels, and that the reservoir pressure was 3,144 psi. on January 1, 1953. The same advantages of higher recovery and flowing production discussed in the Bacon lime portion are apparent in this reservoir. The producing rate has been declining since 1952, however, as a result of a decrease in available producing wells. This is readily apparent from the map shown on Fig. 5. The period of peak producing rate has now past for this reservoir and will continue to decline as the remaining producers are flooded out.

The presence of two extensive shale barriers or "islands" on the northeast and southwest flanks of the reservoir are shown as shaded areas in Fig. 5. The first injection wells were Nos. 57-1 and 30-2.

In previous studies it was stated that this reservoir had an initial partial water drive which could sustain about 1,000 bbl. per day of stock-tank oil production if no water was produced. This partial water drive was augmented by water injection into wells 57-1 and 30-2 until 1950. The regular advance of the water front along the south flank will be noted. This, of course, was evidenced by the successive flooding out of the various producing wells shown on Fig. 5 as the flood moved in.

During 1950, however, it became certain that water was moving in from the south flank only and that no water was moving in from the northwest flank. Of particular concern was the fact that well 16-2 began producing water earlier than expected. As a result of these indications, injection well 57-1 was shut down and well 35-1 was converted from a Bacon producer to a Hill sand injection well. Subsequently well 16-2 returned to pipeline-oil production and since that time the movement of south-flank water has been virtually stopped.

During 1951 and 1952 the material-balance calculations indicated that a substantial portion of the injected water was not entering the reservoir. After ascertaining that there were no casing leaks in either of the injection wells, it was concluded that well 30-2 was too remote from the displacing front and that almost half of its injected water was going downdip and repressuring the aquifer. Accordingly, well 30-2 was

CONVERSION FUNDS FOR IMPORTED EQUIPMENT

OIL INTERESTS IN CANADA?

You need The Bank of Toronto

...AND HERE'S WHY

The Bank of Toronto is geared to give you speedy service in the heart of Canada's oil boom.

- FINANCING FOR DEVELOPMENT OF PROVEN WELLS
- LIAISON SERVICE FOR OIL MEN
- FOREIGN EXCHANGE INFORMATION AND BUYING OF FOREIGN FUNDS
- ARRANGEMENT OF TRAVEL FUNDS FOR BUSINESS TRIPS
- ACCOUNTS FOR PAY OPERATIONS ON THE JOB
- TRANSFER OF FUNDS TO ALMOST ANY PART OF THE WORLD FOR FOREIGN WELL EMPLOYEES

PAYROLL ACCOUNTS FOR DRILLING COMPANIES

Write today for full particulars—you'll appreciate our contacts in the Canadian oil industry.

CONSULTING GEOLOGICAL SERVICE

THE BANK OF TORONTO

Established 1856

A. R. Profit, Manager, The Bank of Toronto, *Main Branch, Calgary, Alberta, Canada*

P. W. Atkinson, Manager, The Bank of Toronto, *8th & 4th Ave. Branch, Calgary, Alta., Canada*

I. J. Hutton, Manager, The Bank of Toronto, *Edmonton, Alberta, Canada*

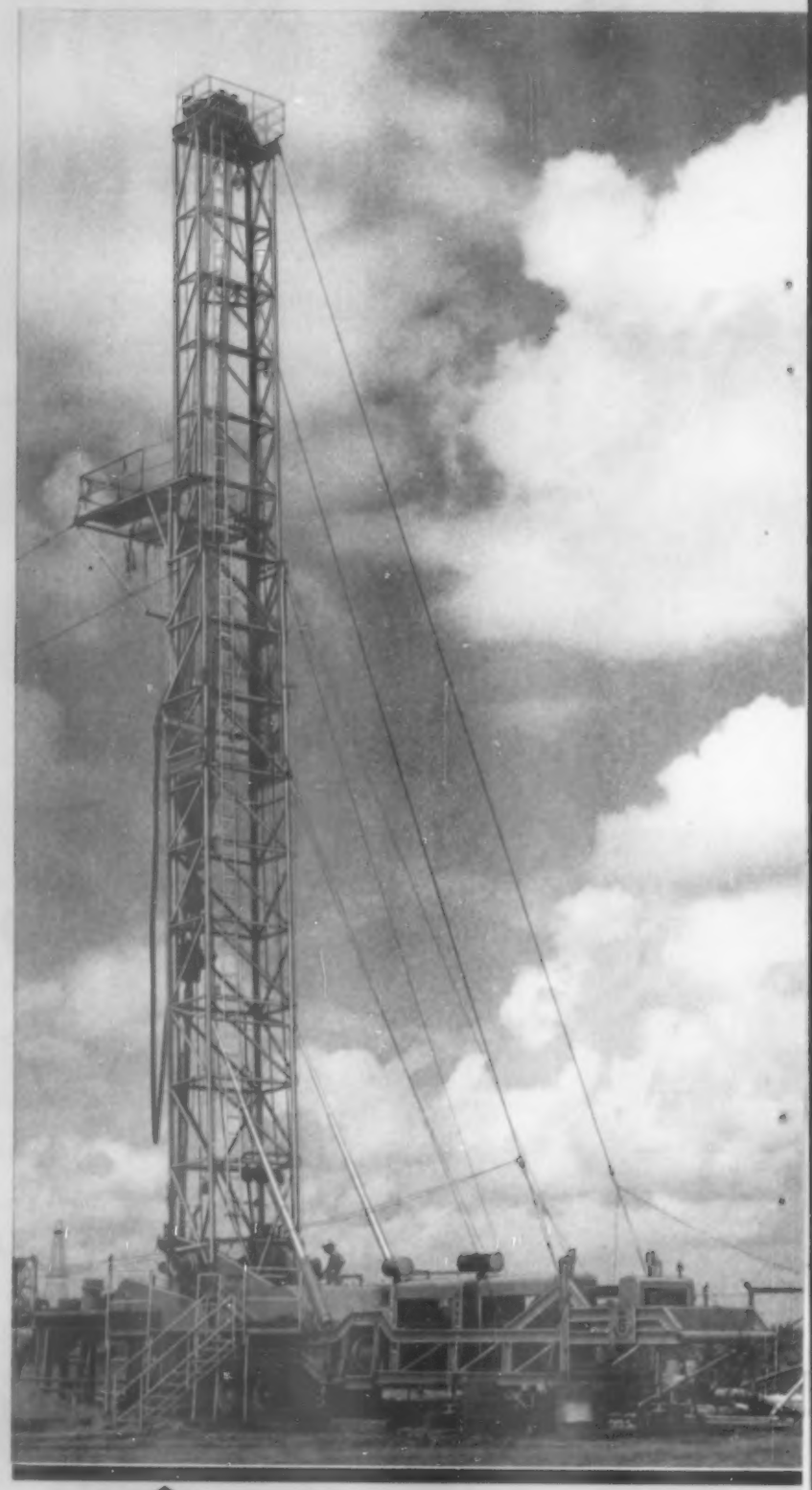
3 Great SLIM HOLE RIGS

FOR 5,000-FOOT TO 10,000-FOOT DRILLING

HIGHLY MOVABLE
Designed for highway moving, yet all full-size drilling rigs.

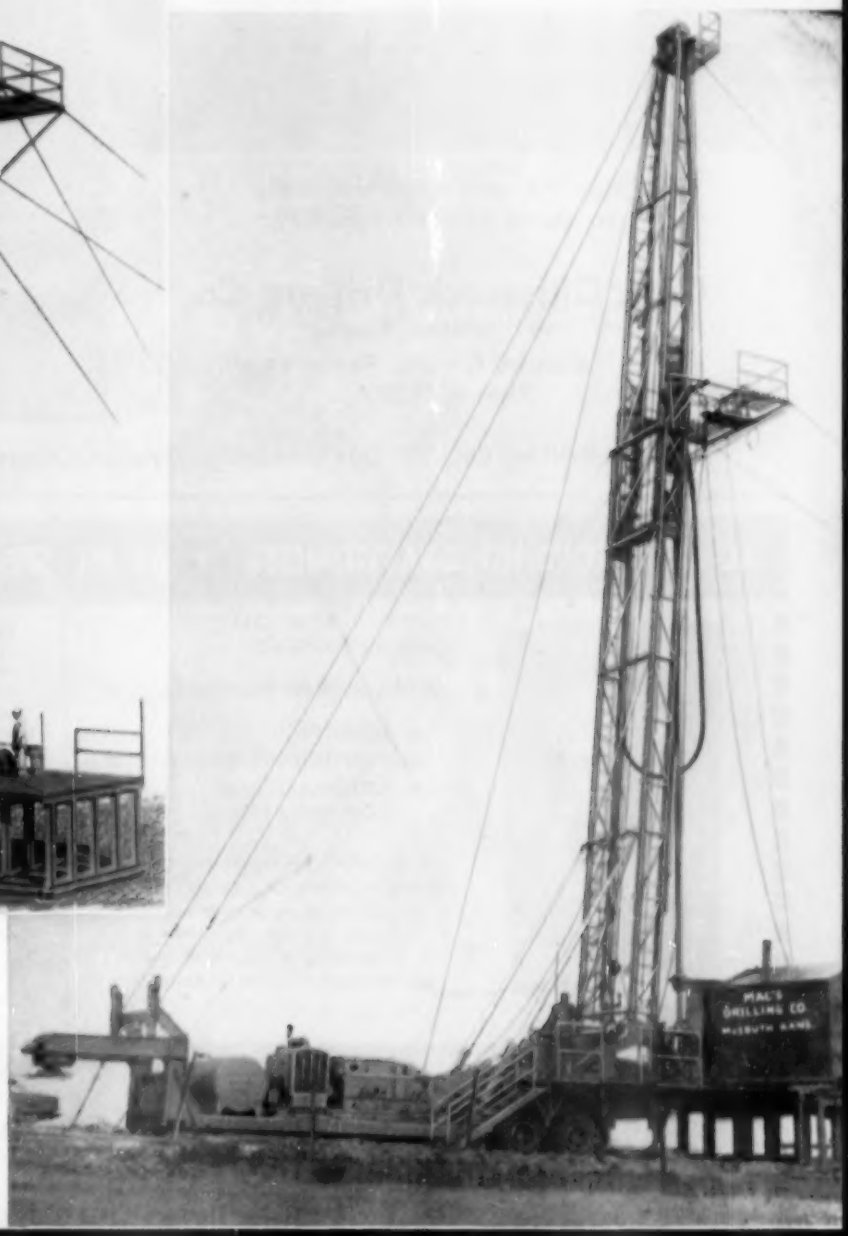
QUICK RIG-UP
Can be spotted and mast raised in minutes—complete rig-up in 3 to 4 hours.

LOW IN COST
Compare the initial cost with any rig and you'll find more rig per dollar. Check your slim hole drilling rig requirements with CARDWELL. You'll be miles ahead in footage and thousands of dollars in profits.



CARDWELL "TRAILERIG" is best for 10,000-ft. slim hole drilling. Ninety- or 96-foot mast and twin-engine draw works are built into the trailer frame, making a complete, utilized rig.

CARDWELL 152 "TRAILERMAST" with 84-ft., 150,000-lb. capacity mast provides the maximum in movability and rig-up speed. Model AH or Model L single engine draw works can be mounted on trailer frame. Built-in hydraulic system erects mast.



CARDWELL 151 "TRAILERMAST" can be used with Model L, Super S, or Model D draw works, and is moved complete with lines and block reeved up. Ninety-six-foot mast with 150,000 lbs. capacity is raised by draw works mounted on trailer frame.

CARDWELL

REG U S TRADE MARK PAT OFFICE

THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

CARDWELL MFG. CO. INC.

P. O. Drawer 2001 . . . Long Distance Telephones 138—139—130

Cable Address "ALL STEEL," Wichita — "CARDSTEEL," New York

Wichita, Kansas, U. S. A.

THERE IS A CARDWELL PARTS STOCK NEAR OR IN EVERY OIL FIELD OF THE WORLD

From the Mountains

Rigs for any depth drilling to serve the Oil Industry

To the Sea

C. G. Glasscock Drilling Co.
1601 Wilson Tower
Corpus Christi, Texas
Phone 48277

Mesa Drilling Co., 207 Denham Bldg., Denver, Colorado, Ph. AComa 8668

AC-ME RECORDING GRAVITOMETER • AC-ME SPECIFIC GRAVITY BALANCE

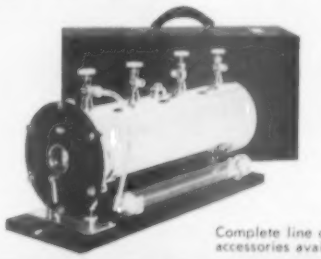
for accurate gas measurement.

- SENSITIVE
- CONTINUOUS RECORD
- AUTOMATICALLY COMPENSATED

This instrument has been designed for accuracy in determining specific gravity of gas—it contains no rotating parts that will wear out and operates on the principle of weighing a volume of gas in comparison with an equal volume of air.

ADOPTED BY THE NATURAL GASOLINE ASSOCIATION AS THE MEANS FOR DETERMINING THE SPECIFIC GRAVITY OF NATURAL GAS

Designed and constructed to meet the specifications required for determining the specific gravity of gas under the various conditions found in both field and laboratory.



Complete line of accessories available

cenco

Cenco . . . one dependable source of supply for everything you need in scientific instruments and laboratory supplies. Over 15,000 items . . . 14 branch offices and warehouses.

R.S.C. TULSA

REFINERY SUPPLY COMPANY
621 EAST FOURTH STREET • TULSA 3, OKLAHOMA
2215 McKINNEY AVENUE • HOUSTON 3, TEXAS

CENTRAL SCIENTIFIC COMPANY
1700 IRVING PARK ROAD • CHICAGO 13, ILLINOIS
CHICAGO NEWARK BOSTON WASHINGTON DETROIT SAN FRANCISCO
SANTA CLARA LOS ANGELES TORONTO MONTREAL VANCOUVER OTTAWA

shut down and two former Hill sand producers, namely 25-1 and 25-2, were converted to Hill sand injection wells.

During 1953, well 67-3 was also converted to a Hill sand injection well in order to more efficiently sweep out the oil in the western area of the reservoir. At the present time the ratio of east-side to west-side injection rates is approximately 5 to 1. This is in accordance with the over-all plan of achieving substantially an end-to-end sweep. This is resulting in higher utlimate recovery by giving maximum flow of injected water through the sand and at the same time permits oil recovery with low water-oil ratios.

Referring again to Fig. 2, it will be noted that the cumulative produced water-oil ratio was 0.0775 to 1 as of October 1, 1953, and during the last 6 months interval the average water-oil ratio was 0.264 to 1. At the present time about 89 per cent of the Hill production is flowing and 11 per cent is by artificial lift. Producing wells are not shut down until their water production exceeds 90 per cent.

Pittsburg Sand

The pressure and production statistics of the Pittsburg sand reservoir are shown in Fig. 3 in the same manner as previously outlined for the Bacon lime and Hill sand reservoirs. As of April 1, 1954, the reservoir had produced about 5.07 million barrels of stock-tank oil, or about 7.39 million barrels of reservoir oil. At that time 5.59 million barrels of water had been injected and 0.06 million barrels of water had been produced, bringing the net water injected to 5.53 million barrels. The net reservoir withdrawal amounted to 1.86 million barrels which in turn is reflected in the average reservoir pressure of 2,785 psi.

This reservoir had the lowest average permeability of the three reservoirs and the permeability to the injected water was considerably less than the average air permeabilities. As a result, most of the injection wells required surface injection pressures of 3,000 to 3,600 psi. This was particularly true in the early phase of the project when most of the injection wells were located below the oil-water contact.

Most of the former Pittsburg sand oil producers have been converted to water injection wells in the Pittsburg sand. These former producers have tended to have higher average injection capacities than the initial injection wells, though the surface injection pressures are still about the same.

Also, the reservoir pressure response has improved as a result of converting former productions to injection wells. This is very much in evidence from the data recorded in Fig. 3. It will be noted that although the average injection and producing rates have been fluctuating, the reservoir pressure has been rising during the past 4 years.

Front positions . . . The estimated positions of the various flood fronts are shown at 2-year intervals on the map on Fig. 6. Also shown are the locations of all present and former Pittsburg sand water injection wells. As previously mentioned, the initial injection wells were located below the oil-water contact. This was in conformance with the initial plan which was based on the concept of a peripheral flood. Later, wells 35-1 and 62-1 were also converted to water-injection wells in accordance with the peripheral concept, but these two wells were inside the reservoir limits. By that time we were convinced that we were not deriving full benefit from the injection wells located in the aquifer, and that a portion of their injected water was actually going downdip and repressuring the aquifer.

Also, by that time several former east-side producers had been converted into better than average Pittsburg in-

. . . Here's How To Cut Cost and End Trouble In Your Salt Water Disposal Wells!

Whether your salt water problem is re-pressuring or simple disposal, you can reduce overhead costs sharply by eliminating replacement expense due to corrosion losses. Have your new or existing tubing string lined with Tube-Kote's TK-43, the amazingly tough corrosion-proof lining. TK-43 gives your pipe years of life in either injection or production wells.

No other type of corrosion control gives you such complete protection: tubing lined with TK-43 is not damaged by brine, acids, alkalis, or crude; its sleek surface resists abrasion and ends flow-velocity erosion; its insulating properties stop electrolytic action caused by contact of dissimilar metals.

Write or call today for complete engineering data on other Tube-Kote linings and plastic pipe.

TUBE-KOTE, INC.
P. O. Box 20037 • Houston 25, Texas

TUBE-KOTE
First Name In Corrosion Resistance
TUBE-KOTE T.M. Reg.

jection wells. Wells 35-1 and 62-1 also turned out to be above-average Pittsburg injection wells, both of which could take around 500 bbl. per day of water at 3,000 to 3,600 psi. surface injection pressure.

As the east side floods developed and merged, however, it became increasingly apparent that the over-all production program could be made more efficient by changing from a peripheral advance concept to an end-to-end sweep. It was not possible to achieve this objective all at once.

At that time a substantial portion of the then existing injection capacity was on the west side. Well 57-1 was shut down in 1951; well 62-1 was shut down early in 1952; and well 35-1 was shut down in the latter part of 1952. This capacity was concurrently being replaced on the east side.

Well 47-1 was drilled as a dual Bacon-Pittsburg injection well during the latter part of 1950, and turned out to be an unusually good Pittsburg sand injection well, averaging initially about 600 bbl. per day. Although it had a relatively short life, 47-1 delivered enough water into the Pittsburg to effectively flood out its nearest producer, namely 29-1, before it (47-1) was lost as a result of corrosion.

Subsequently in 1952, 29-1 was converted into a Pittsburg water-injection well and as such has been able to average over 1,500 bbl. per day ever since. As a result of the exceptional performance of 29-1, well 47-2 was drilled to the Bacon lime only, as a replacement for 47-1.

Well 44-1 was drilled as a dual Bacon-Pittsburg injection well during the latter part of 1948. This was only an average Pittsburg water-injection well. Although its initial capacity was about 350 bbl. per day it averaged taking about 220 bbl. per day during the 4 years of its life. During 1952, the capacity of 44-1 began to decline and all efforts to restore its usefulness were futile. This was especially disappointing, both because of the strategic location of 44-1 and the fact that well 27-1 had begun to make water. After 44-1 was shut down the water production from 27-1 began to decrease gradually although artificial lift was still necessary.

In connection with this it must be recalled that well 29-1 had been converted to Pittsburg injection during the latter part of 1952, and that its capacity alone was greater than the combined capacities of 30-1, 30-2, and 31-1. Consequently, the front which had been pushed into 27-1 by 44-1 injection was being pushed back and away from 27-1.

Naturally we were then faced with a dilemma as to whether or not to convert 27-1 to a Pittsburg injection well. To do so would have gone against the established policy of using a producer as such as long as practical. Also, there was considerable doubt that another injection well in this area would be justified.

Prior to drilling 44-1 an attempt had been made to make a Pittsburg injection well out of 32-1 but all efforts, including a shot of nitroglycerin, had failed. Subsequently, during 1953, well 42-1 was drilled as a possible Bacon-Pittsburg producer or injection well. On 30-day tests well 42-1 produced 100 per cent water from both the Bacon and the Pittsburg, following which time it was converted to Pittsburg injection.

Well 42-1 has made a better than average Pittsburg injection well, being able to take about 950 bbl. per day at the prevailing well-head injection pressures. As a result of 42-1 water injection into the Pittsburg, well 27-1 has started flowing again and currently is producing pipeline oil. Well 27-1, however, will probably be flooded out during the coming year and at that

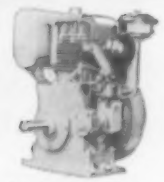
But WISCONSIN HEAVY-DUTY Air-Cooled ENGINES Deliver Dependability

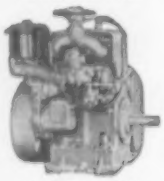
Down in the Midkiff field, Upton County, Texas, where the El Paso Natural Gas Company is engaged in one of the largest expansion programs in pipe line history, Wisconsin Air-Cooled Engines are in there pitching, and doing a good job.

The picture shows a Wisconsin Model VF4D operating the pumps and agitators on a pipe line tar pot. And this job, like many other power applications in the oil field, calls for Dependable Power.

Because of Wisconsin heavy-duty engineered design and construction, these rugged engines keep slugging away as long as there is work to be done. They have the built-in *lugging power* that enables them to *hang on* when sudden shock loads slow down the engine speed, and pick up again without loss of efficiency.

For oil field service, 2-cylinder and 4-cylinder engines are equipped with Stellite Exhaust Valves and Inserts, whether specified or not — and all 4-cylinder engines are supplied with a specially designed oil filter element.


4-cycle single cylinder models, 3 to 9 hp.


2-cylinder models 7 to 15 hp.

V-type 4-cylinder 15 to 36 hp.

You can't do better than to specify Wisconsin Engine Power for your equipment.

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
619 SOUTH MAIN STREET • TULSA, OKLAHOMA
3420 McKINNEY AVENUE • HOUSTON, TEXAS
505 SOUTH MAIN STREET • WICHITA, KANSAS
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS

A 7957-½ I-O

time will be converted to a Pittsburg injection well also.

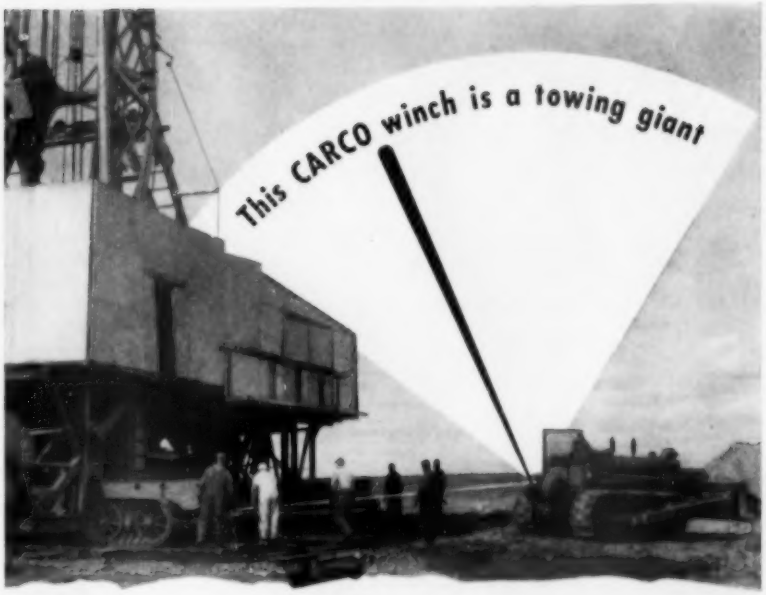
Increased capacity . . . With the conversion of 42-1 to Pittsburg injection the average east-side water-injection capacity that can actually be sustained has been increased to about 3,500 bbl. per day. Two other wells, namely 28-1 and 28-2, are now producing water and are due to be converted to Pittsburg injection during the coming year. Thus, it is readily apparent that the problem of injecting water into the Pittsburg sand has been solved effectively and that this reservoir is now ready for a higher rate of oil production. Actually the problem is now shifting from one of getting the water in to one of finding enough available oil producers.

It will be noted that most of the Pittsburg producers are concentrated on the east and west sides of the reservoir respectively. At the present time most of the wells in the central area are being used as dual Bacon-Hill producers. It is anticipated that as these Hill sand producers are flooded out they can then be utilized as dual Bacon-Pittsburg producers. To assist in this program the rate of Hill sand reserve depletion is maintained at approximately double the rate of Bacon and Pittsburg reserve depletion.

Some difficulty has been experienced in several instances where water from one of the higher zones has come in contact with the Pittsburg sand as a result of a dual-completion packer leak. Usually this has happened long after the upper zone has been flooded out but not squeezed off. The result almost invariably is that after squeezing off the upper zone the Pittsburg section either may not produce at all or may require artificial lift, whereas previously it was a good flowing well.

Good results have been attained, however, by the injection of oil or acid-containing surface-tension additives. All of the Pittsburg oil producers thus affected have been restored to normal production by this procedure. On the other hand we have also experimented with surface tension additives and wetting agents by injecting same into various Pittsburg sand injection wells. This was done primarily to determine whether or not these wetting agents would increase injection-well capacity. None of this work has resulted in any success to date as the injection capacity was neither increased or decreased for any of the wells used in these experiments.

Referring again to Fig. 3, it should be noted that the cumulative produced



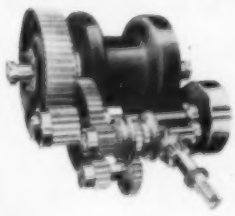
Rigs weighing up to 225 tons moved up to 8 miles

. . . thanks to pulling power of CARCO winch!

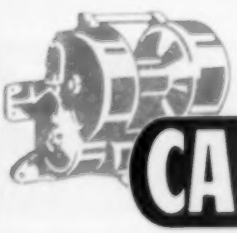
Without disassembling, rigs are moved from one location to another in the Tioga oil field in North Dakota. A Model J Carco winch on an International TD 24 is used by the Mendenhall Construction Company to do the pulling. Towing rigs weighing from 150 to 225 tons from two to eight miles is a real test of a winch innards. Hills, mud, sand, snow and frozen ground present problems. If the tractor loses traction, the operator releases winch brake and, paying out line, moves ahead to firm footing. He then winches the rig up to the tractor. The efficient doubling of tractor pulling power does the job.

Mr. Mendenhall states that Carco winches are more compact and better constructed. In over 2000 hours of rough, tough work, maintenance expense has been zero.

You can expect greater value from the leading producer, and get it from Carco, first in winch production. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Ore., and Franklin Park, Ill.



Doubling the pulling power of the most powerful crawler tractors calls for a gear train that's tough and rugged. The Carco Model J winch converts tractor power into line pull efficiently and directly through a 4-stage constant mesh gear train. The doubled line pull is made possible by a high ratio of gear reduction. As faster line speed is generally desired for paying out the line, a lower gear ratio is provided in reverse. Heavy-duty gears and shafts of heat-treated special alloy steel guarantee a large overload capacity. Precision cut, gears and shafts, with anti-friction bearings, operate in a continuous oil bath.



WINCHES
FOR ALL
INDUSTRIAL
TRACTORS

CARCO®

Fyr-Fyter

DRY CHEMICAL EXTINGUISHERS

Reach for Fyr-Fyter Dry Chemical Extinguishers . . . with absolute assurance of protection performance! They're engineered to PERFORM with "Sealed-In" power that's harnessed in perfected air-tight, water-tight sealing to provide fast, positive, fire-fighting action . . . *without fail!* The simple, squeeze-grip nozzle control releases a thrust of force that's SURE . . . expelling a long-range, heat-shielding, flame-smothering stream of free-flowing chemical powder. On contact, the flame-smothering powder puts out fires in gasoline, petroleum products, paint, varnish, lacquer, turpentine, alcohol . . . *all flammable liquids, gas, butane, propane, chemical and electrical fires!* Stainless steel tank and aluminum castings provide extra strength for more rugged use, and less weight for easier handling.

For assured protection performance . . . be SURE with an Underwriters' Approved Fyr-Fyter Dry Chemical Extinguisher!

WRITE ON YOUR LETTERHEAD FOR FULL DETAILS TODAY!

FF-5

The Fyr-Fyter (FIRE) (FIGHTER) Co.

221 CRANE STREET, DAYTON 1, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

BRANCH OFFICES: *New York, Boston, Philadelphia, Chicago, Atlanta, Dallas, San Francisco, Portland, Seattle.*

water-oil ratio as of April 1, 1954, was 0.001272. Also, the average water-oil ratio during the last 6-month interval was 0.096 to 1. At the present time 85 per cent of the oil production from this reservoir is from flowing wells and 15 per cent is produced by artificial lift. Wells are produced to 90 per cent water cut before being converted.

Recovery estimates . . . When the project was first getting under way, the increase in recovery due to water injection was estimated to be at least 45 per cent greater than by natural methods alone. The data then available indicated that the ultimate recovery should be at least 70 per cent greater than by natural or primary methods. During the past 4 years these favorable indications have continued along an upward trend. It is now believed that the ultimate recovery from the three reservoirs will be at least 90 per cent greater than would have been possible by natural or primary methods alone.

Reference should also be made to the manner in which the chloride and total solids content of the various floods has been used to trace the movement of the floods. This has been particularly useful in the Bacon reservoir (see Fig. 4) in ascertaining from which flood a given well is producing water. The formation water from all three reservoirs contains about 140,000 p.p.m. chloride; the Woodbine water contains about 50,000 p.p.m. chloride; and the fresh water contains about 140 p.p.m. chloride.

Of particular interest is the fact that the initial breakthrough water from a producing well will always have a high chloride and total solids content similar to the natural water in that reservoir. Bacon and Pittsburg breakthrough producers will show a gradual decline in chloride and total solids content, approaching the analysis of the water being injected into the flood from which the water is coming. This observation has been made in many instances in which the injection wells were not injecting into the aquifer. It is quite apparent, therefore, that a "bank" of high chloride—total solid water is always present in the displacing front. Whether or not this bank is formed by the actual displacement of interstitial water or by diffusion is not certain as yet.

References

1. Trube, A. S., and DeWitt, S. W., Trans. A.I.M.E. (1950), 189, T. P. 2939.
2. Carpenter, C. B., Anderson, K. F., and Cook, A. B., U.S.B.M. R.I. 4594, 1949.

NEW GENERAL PARTNER ADMITTED BY LAMBERT OIL EXPLORATION CO.

J. F. DOUGHERTY

Lambert Oil Exploration Company, 2 Wall Street, New York, announced today the admission to general partnership of J. F. Dougherty. Mr. Dougherty recently resigned as vice president of Empire Trust Company, Oil and Natural Gas Department, and as vice president Oil and Gas Management, Inc. He previously was vice president of DeGolyer & MacNaughton, Dallas, Texas, for which firm he acted as senior geologist and petroleum and natural gas engineer.

50 years in the making

BLACKMER'S "Gold Seal" TRUCK PUMP

Long life and economical operation is assured **BLACKMER'S** customers with a new design which represents 50 years of experience in building the famous Rotary Pumps which are,

"SELF-ADJUSTING FOR WEAR"

The new design incorporates all of the time tested **BLACKMER** features plus:

The BLACKMER CARTRIDGE-TYPE *Mechanical Shaft Seal.*
Heavy Duty Anti-friction Bearings completely protected from the pumpage.

Available in two sizes, 2½" and 3", rated at 100 GPM and 200 GPM respectively. "Listed by Underwriters' Laboratories, Inc."

Write for complete details.

liquid materials handling

BLACKMER

Industrial, Hand and Truck Pumps, Strainers, Pressure Control Valves

BLACKMER PUMP COMPANY, GRAND RAPIDS 9, MICH.

DIVISION SALES OFFICES — NEW YORK • ATLANTA • CHICAGO
GRAND RAPIDS • DALLAS • WASHINGTON • SAN FRANCISCO

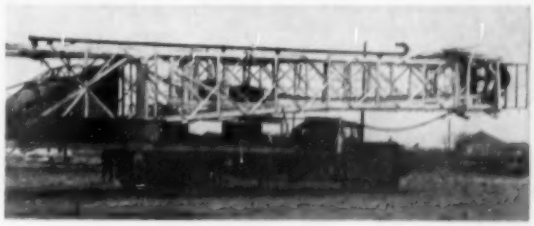
See Yellow pages for your local sales representative

NEW!

KLB TELESCOPING DERRICK

LOWERED . . . MOVED 5 MILES and RAISED in only 5 HOURS!

The block, mud hose, draw works and 97-foot derrick are moved all in one load • The derrick, telescoped down, is laid over the draw works by means of two telescoping hydraulic rams • Leaf extension folds over to enable the complete substructure and tool house to be loaded on one truck • After substructure is set and leveled, the derrick is raised and ready to drill in less than an hour • Available in 97-foot or 127-foot height; capacity 400,000 and 550,000 pounds • Extensively field tested.



WRITE FOR ILLUSTRATED FOLDER

KLB DERRICKS

WICHITA NATIONAL BANK BUILDING • WICHITA FALLS, TEXAS

Texas Pipelines . . . Over 82,000 Miles

(Continued from page 151)

quick to turn to this new method of protection, using both rectifiers and sacrificial anodes for current sources.

Centrifugal pumps . . . Until the middle of the 1920's the gas or diesel engine and the reciprocating pump remained the mainstay of pipeline pumping equipment. Toward the end of the twenties, however, centrifugal pumps driven by electric motors were being used in large numbers on new pipeline projects.

First installed as boosters on overburdened trunk lines, the electric-centrifugal units soon became strong competitors with the older units. Ease of installation, efficient operation, and low maintenance made them a natural for mainline service.

One of the earliest lines to be completely equipped with electric-centrifugal pumping units was built in 1928 by Atlantic Pipe Line Co. This 590-mile, 10-in. line originated in Midland and terminated at the Atreco refinery near Port Arthur.

One of the first attempts at automatic operation of a pump station was made by Magnolia in 1929 at the Sardis station south of Fort Worth. This station was equipped with electric-centrifugal pumping units and was so arranged that an increase or decrease in suction pressure initiated a sequence of control-relay operations. One or more pumping units were put on line or shut down by the relay devices. In a sense the equipment was remotely controlled since its operation was determined by discharge pressure of the upstream station.

New lines . . . Keeping abreast of rapid advances in operation methods and engineering techniques, total mileage of pipelines in the state increased at a dizzy pace through the twenties and into the thirties. In the crude-line category no new major companies were formed and most of the construction was accounted for by established firms expanding systems, replacing old lines, laying loops, and modernizing tank farm and trunk-station facilities.

The Texas Co. recorded important firsts of pipeline history in its construction program of 1928. In that year, after experimenting with electric-arc welding on the Corsicana-San Augustine line, the company built the first all-electric-welded line from Pecos County, West Texas, to San Marcos. Aerial photography also was used for the first time in making the original survey for the line.

In construction of other lines during the same period, The Texas Co. was the first to use 60-ft. joints of mill-coated and wrapped pipe.

Humble Pipe Line Co., organized in 1919, continued its mushroom growth and by 1926 was transporting crude from most of the important fields in the state. In 1925 this company completed a very important 8-in. line from the Kemper area of West Texas to its Ingleside refinery. This was the only direct trunk line from that area to the coast and remained so until 1927.

In the next 4 years major trunk lines were laid by Humble into the Houston area from East, North, and South Texas. By 1932 the company had become and has remained the operator of one of the largest pipeline systems in the state.

Discoveries in East Texas in 1930 started the last construction boom for crude pipelines until the end of the depression. By 1931 there were nine major lines transporting crude from East Texas field. Humble, Atlantic, Sun, Shell, Magnolia, Yount-Lee Oil Co., Sinclair Pipe Line Co., Texas-Empire Pipe Line Co., and Pure Transportation Co. built hundreds of miles of 8, 10, and 12-in. lines, most of them terminating at refineries on the coast.

Products lines . . . The state's products-line industry started in 1930. Magnolia was the first to venture into the field with the building of a 28-mile, 4-in. line from its refineries in Fort Worth to the Dallas market area.

Shortly after this, Phillips Pipe Line Co. started construction of the state's first long-distance products line. This 8-in., 640-mile line delivered products from Phillips' Borger refinery to St. Louis.

Early in the life of the products pipeline industry it was discovered that crude-line equipment and operating procedures were unsatisfactory when applied to products movements. Better seals for pumps and valves, closed-system line operation, and minimum storage time were found necessary for economical operation. Major difficulties were gradually overcome, however, and in a few years products lines were being built to all large market areas of the state.

Large gas systems . . . Although Texas Panhandle field was discovered in 1918 it was not until 1928 that suitable market conditions allowed the building of major pipelines from the area. Except for the amounts taken by small nearby markets, this great reserve of gas was being flared to the atmosphere —as much as a billion cubic feet per day, according to the Texas Railroad Commission. However, in the 4 years from 1928 to 1932 the waste was largely eliminated by the building of several large lines from the area.

Cities Service Gas Co. saw the opportunity in 1928 to gain tremendous gas reserves for its midwestern customers and started a 20-in. line from the Panhandle to Wichita, Kans. Original capacity of the line was 70,000,000 cu. ft. per day but this was upped to 130,000,000 cu. ft. when the line was extended to Kansas City in 1930.

Panhandle field was also connected to the Denver market in 1928 with the construction by Colorado Interstate Gas Co. of a 20 and 22-in. line with a capacity of 100,000,000 cu. ft. of gas per day.

Lone Star became active in the field in the same year and laid a 200-mile, 20-in. line to connect with its existing system near Wichita Falls.

In the early thirties three other important lines originated in the Panhandle area. The first of these was that of Panhandle Eastern Pipe Line Co., a 22-in. line started in 1930 and completed in 1932 with its terminal in Indiana.

A 24-in. line to Chicago was built at about the same time by Natural Gas Pipe Line Co. of America.

Another line from the area to Chicago was completed in 1931 by Continental Construction Corp. Important from a material standpoint, this line was built with 24-in., high-strength, seamless pipe produced by National Tube Co. From that time forward seamless pipe in large diameters was available for big-inch construction.

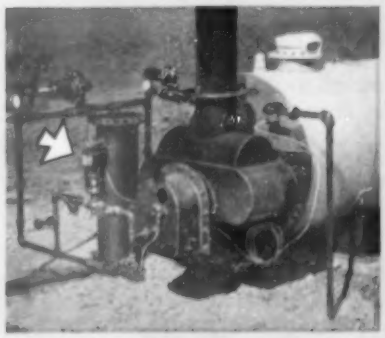
East Texas . . . Meanwhile, important activities were under way on the other side of the state. Magnolia Gas Co., with large gas reserves in North Louisiana and industrial outlets on the coast, built the state's first long-distance, all-welded gas line in 1925.

This line, which carried gas from fields near Shreveport, was constructed of 14, 16, and 18-in. pipe—the first telescoped line in the state. It is still in service as a part of the transmission system of United Gas Pipeline Co. Shortly after this the company built a 2 0and 22-in. line from Louisiana to Dallas, also welded.

During the same period Dixie Gulf Gas Co. constructed an important 22-in. line from the Waskom area to Beaumont. This line, laid at a rate of 2 miles per day, was constructed of 30-ft. pipe joints with bolted couplers. Small, wheeled tractors with stiff-leg booms were used in lineup and lowering operations.

The largest gas pipeline company in

USED BY LEADERS IN THE INDUSTRY



Want Safe, Reliable Control for Your Field Processing Equipment?

Install POWERS

No. 11-OFT Self-Operating Temperature Regulator

✓ Check these features that give Economical Trouble-free Performance — in all kinds of weather

1) Thermal system has OVER-heat protection. Powerful two-ply bellows and single seat composition disc valve assures tight shut off.

2) Valve stem lubricator helps give closer control, reduces packing gland troubles.

3) Rugged, built for long reliable service in all kinds of weather. Operate efficiently down to 60° F. below zero.

4) Durable Valves are direct acting, have single seat bronze body with double unions, for easy installation, composition disc and stainless steel seat.

5) Temperature adjustment range: 110 to 190° F., other ranges between 30 to 370° F.

6) Bulb Well is cadmium plated steel and extra heavy plain capillary tubing is 10 ft. long.

Powers No. 11 Regulators are backed by over 60 years experience making *SELF-OPERATING* controls. They are used by leading manufacturers of heaters and treaters.

Simplify Your Control Problems—Standardize on Powers

[b47]

POWERS CONTROL

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS • Offices in Over 50 Cities in U. S. A., CANADA and MEXICO

See Your Telephone Directory

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

South Texas during this period was Houston Pipe Line Co., organized in the early twenties. This company's original 10 and 12-in. lines into Southwest Texas had been looped with 14 and 16-in. by 1930 and the capacity of the system raised to over 100,000,000 cu. ft. per day for delivery into the Houston area.

Prewar and War Years

Pipelining in Texas entered a deep slump following the heavy construction associated with the East Texas discoveries and the gas lines from the Panhandle and did not recover until late in the thirties. Through the mid thirties activities were confined mainly to the building of short lines for crude, products, and gas service.

Notable pipeline projects in this period did include the state's first long-distance butane-products line, constructed in 1936 by Humble. This 8-in., 11,000-bbl. per day line extended from Kilgore to Houston and was important from a conservation standpoint in that it provided a needed outlet for small processing units in the East Texas area.

A second line of this type was not constructed until 1939 when Magnolia built a 4, 5, and 6-in. line from Kilgore to Beaumont.

Despite the lack of major construction projects, decided gains were recorded in operation, construction, and equipment. Some of them are:

1936 . . . Development of the positive-displacement rotary pump by R. J. S. Pigott, of Gulf Research & Development Corp. This type unit rapidly became a strong contender with older types for field-gathering service. Later modifications made it adaptable to trunk-line service.

1936 . . . Automatic shutoff valves for lease tanks used in East Texas field. When properly applied this device ended the problem of entrapped air in field-gathering lines.

1937 . . . Four and six-flame acetylene welding tips introduced for pipeline work. The acetylene welding method was still important in pipeline construction, through its use was dwindling rapidly.

1937 . . . Use of "stovepipe" welding method becomes widespread. This rapidly replaced the older practice of roll welding and evolved into method in use today.

1938 . . . First use in Texas of a powered, line-traveling machine which combined coating and wrapping into one operation.

1938 . . . Phillips reports excellent results from use of inorganic inhibitors which had been started in 1936. Prior to this inhibitor program rust was causing much trouble with pumps, valves, meters, and gages.

1943 . . . Development of first machine for smooth bending of large pipe during construction. Pipeline officials later stated that this one machine, more than any other piece of equipment, made big-inch construction practical and economical. Bending machines were used extensively on the War Emergency 20-in. products line.

The war years . . . By 1939 pipeline activities in the state were on the upswing as a result of increasing petroleum demands caused by war scares. With the beginning of hostilities this increase rose sharply and continued throughout the war despite pitiful shortages of manpower, material, and equipment.

Of course the entire petroleum industry was heavily pressed during the war, but the pipelines in particular were crowded into top-capacity operation due to tanker sinkings. Many makeshift arrangements in station equipment and line facilities were resorted to in filling the demands.

A measure of the success of pipeline efforts is given by the fact that in 1940 the pipeline throughput from the Southwest to the East was only 45,000 bbl. per day but was an astounding 750,000 bbl. per day by the war's end.

Most spectacular events during the war concerned the rapid planning, engineering, and construction of both the 24-in. crude line and the 20-in. products line from Texas to the Atlantic Coast. The lines were financed by governmental agencies and were built by War Emergency Pipelines, Inc., a nonprofit organization composed of pipeline managers and engineers from several of the larger companies.

The W.E.P. "Big-inch" originated in Longview as a 24-in. line and extended into Illinois and later to the eastern seaboard—1,800 miles of line. First of the two lines to be constructed, this giant crude line was in operation from Texas to Illinois within 7 months after construction started. Most of the large pipeline contractors in the nation played some part in the line's construction.

Construction on the important 20-in. products line was started in April 1943 and the Texas-Illinois section was in full operation within 10 months. This "Little Big-Inch" originated near Beaumont and terminated on the East Coast.

Both lines were successful beyond all expectations. By late 1944 the Big-Inch was delivering over 300,000 bbl. per day and the Little Big-Inch 150,000 bbl. per day.

Besides the incalculable contributions that these lines made to the war effort, their construction and operation provided invaluable experience to men of the industry for use in later big-inch projects.

Another important products line built during the war was the Bayou Pipe Line System, a multiple-ownership line. Success in the organization and operation of this system had no little influence on the formation of similar groups for postwar operations.

Six companies joined in 1943 to build this 8 and 10-in. line from Baytown to Baton Rouge, La. They were Humble, Shell, Texas Pipe Line, Pure, Pan American Pipe Line Co., and Crown Central Pipe Line & Transportation Co.

Decline of gas production and increase of demand in the Appalachian region in 1942 paved the way for the most notable gas pipeline project of the war period.

Tennessee Gas Transmission Co. received authorization for a line into the region in September of 1943 and started construction in December of that year. A 24-in. line was laid from South Texas into West Virginia by the company, being completed in the record-breaking time of 11 months.

This was the original line of a company that is now one of the largest of the gas-transmission industry. The original line now has been looped in various sections with 26 and 30-in. and the entire system is capable of delivering 1.5 billion cubic feet of gas per day.

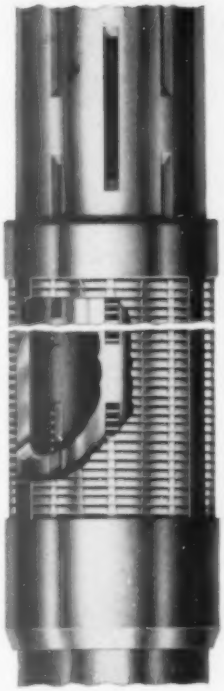
Postwar Years

The modern era of pipelining in Texas started immediately after the war when companies began releasing pent-up energy and capital to replace worn-out equipment and to modernize facilities. Changes in market conditions for natural gas and revisions in thinking of top management toward joint ventures in crude pipelining made this period, above all else, one of big-inch pipelines.

Nothing short of spectacular has been the construction within the past 10 years of large-diameter lines for crude, products, and natural gas. Complete with microwave systems, automatic equipment, remote-control installations, and extensive mobile radio networks, the big-inch systems are a chapter in pipeline history that is unsurpassed.

Not so flashy, but equally important, are operational and engineering trends within the industry. Ever-increasing use of automatic devices, performing of closer engineering studies, development

EMSCO SLOTTED...



A SUPERIOR SCREEN FURNISHED IN A FULL RANGE OF SLOT GAUGES

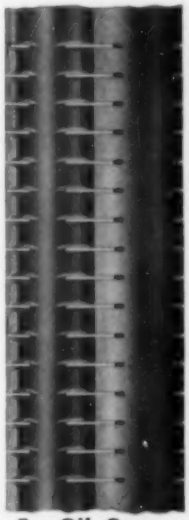
With Emsco, the manufacture of slotted screen pipe is serious business. Our shop is equipped with machines designed especially for this purpose . . . machines that produce high quality slotted screen pipe, with slots ranging from .010 to .100 or larger if required.

We're proud of our facilities for producing this full range of slotted pipe. We're proud, also, of the record established by Emsco Slotted Pipe in wells all over the world. It retains from 80% to 85% of the original collapse strength of the pipe . . . it may be spudded or rotated reasonably without damage . . . may be easily cut and pulled . . . and its V-shaped slots provide maximum drainage with minimum clogging. It's furnished, of course, in all popular sizes of pipe, to lengths as specified.

• • •

Emsco also manufactures "Vertical Slotted" Wire Wrapped Screen, with slotted openings that stay open longer, provide more drainage area per foot and retain 25% more strength than pipe with drilled holes with equal area.

For full information on Emsco "Slotted" and "Wire Wrapped" Screen Pipe, write for a copy of our latest catalog.



For Oil, Gas or Water Wells

EMSCO SCREEN PIPE COMPANY

2219 BROOKS STREET Phone PRestan 6346 HOUSTON, TEXAS

Export Representative: Val R. Wittich, Jr., 30 Rockefeller Plaza, New York 20, N. Y.

Sims Valves

still in use after 15 years in varied, punishing service

"We have not had to put in one new replacement in 15 years"! That's what a petroleum company* reports about the 48 4⅝" Sims Valves in their National Transit 15x11x18 Duplex pump. Service is rugged, too — the Sims Valves handle the complete range from light oils and gasoline through such viscous fluids as heavy oils, molasses, and tar. Full details on the unique engineering features that guarantee such consistent results can be had on request. Ask for Bulletin OG-5.

*Name on request

Sims

PUMP VALVE CO., INC.

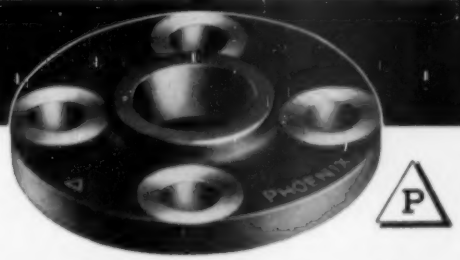
1314 PARK AVENUE, HOBOKEN, N. J.

M & M BLDG., HOUSTON, TEXAS

SP 109

PHOENIX *Drop-Forged* FLANGES MEAN...

MAXIMUM STRENGTH



Long life is assured with Phoenix maximum strength flanges. Forged of mild steel, they are available in a wide range of styles and sizes. Meet ASA requirements and ASME and ASTM specifications.

NEW CATALOG!

Send for free brochure showing Phoenix Complete Line.

FLANGE DIVISION

PHOENIX MANUFACTURING CO.

Catasauqua, Pa. • Joliet, Ill.

natural gas and sulfur..

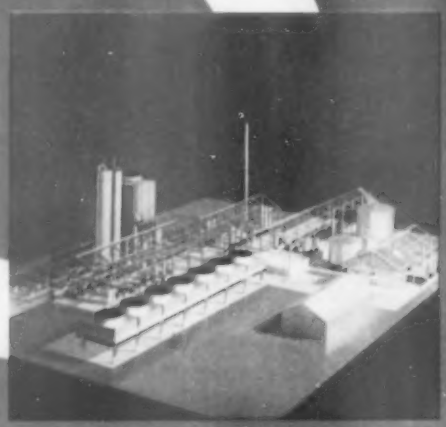
Parsons is engineering and constructing two gas processing plants near Manderson, Wyoming.

The Big Horn Plant will process 15 million cubic feet of sour natural gas daily to yield gasoline, LPG, and sweet gas. These facilities will be owned by eight oil companies: Pegasus Division of Socony-Vacuum Oil Company, Inc. as operator, and Gulf Oil Corporation, Sohio Petroleum Company, Shannon Oil Company, Stanolind Oil and Gas Company, Mule Creek Oil Company, G. & N. Oil Company, and Roy E. Booth.

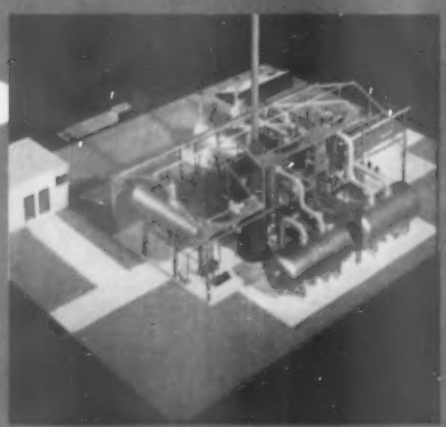
By-product hydrogen sulfide will be piped to an adjacent sulfur recovery plant being built for the Jefferson Lake Sulphur Company.

Both of these plants are planned to be on stream in October 1954.

PARSONS



Natural Gas Processing Plant



Sulfur Recovery Plant

THE RALPH M. PARSONS COMPANY

Engineers • Constructors

617 South Olive Street
Los Angeles 14, California

NEW YORK • TULSA • WASHINGTON, D.C.
ANKARA • BAGHDAD • KARACHI

of new-type prime movers, perfecting of cathodic protection, the swing toward closed systems wherever possible —all are indications of the forward thinking in today's pipeline industry.

The Big Gas Lines

The war's end saw the beginning of the most fruitful period in pipeline history for the building of big-inch gas-transmission lines. Since 1945 gas exports from the state have more than quadrupled and the total mileage of gas lines within the state has almost doubled.

Economic conditions, discovery of large gas reserves, strikes within the coal industry, consumer desire for cleaner and more convenient fuel, pipeline-equipment developments, and big-inch construction know-how gained during the war made the construction of crosscountry gas lines inevitable.

Within a short time after the war several new companies were formed, gas reserves were secured, capital borrowed, governmental authorization obtained, and building programs started. Within 5 years there were a half-dozen new gas lines from the state, ranging from 24 to 30-in. in diameter and stretching for 1,000 miles into the North, East, and West.

The largest single project was that of Transcontinental Gas Pipeline Corp.'s 1,840-mile line of 24, 26, and 30-in. pipe. When installed in 1951 the line had a capacity of 235,000,000 cu. ft. of gas per day and was designed for an ultimate capacity of 550,000,000 cu. ft. It originated in the lower Rio Grande Valley and terminated in the New York area; cost of the project was $225,000,000.

Another giant built at the time was a 30-in. from the lower Gulf Coast into Illinois. Constructed by the Texas Illinois Natural Gas Pipeline Co. this 1,300-mile line has a designed capacity of 524,000,000 cu. ft. per day.

Acquisition of the war emergency lines in 1947 made Texas Eastern Transmission Corp. one of the country's largest gas carriers. In 1945, while sitll in government hands, both the 24-in. crude and the 20-in. products lines had been converted to gas service to alleviate a serious fuel shortage in the Appalachian region. They were operated for a short time under lease to Tennessee Gas but were soon purchased outright by Texas Eastern at a cost of $143,000,000. Recently it has been announced by Texas Eastern that the 20-in. line will be reconverted to products service and that new facilities will be constructed to take its place in the gas system.

The postwar period also saw the rapid expansion of El Paso Natural's system in West Texas and New Mexico. The company built a 26-in. line in 1946 to outlets on the West Coast and looped this with a 30-in. line in 1948. Since the war El Paso has become the largest single exporter from the Permian basin and Panhandle regions. By 1953 its maximum capacity had risen to 1.1 billion cubic feet of gas daily.

El Paso Natural made a radical departure from the remainder of the gas-transmission industry in 1951 with the large-scale installation of internal-combustion turbines for driving centrifugal compressors. In that year seven of these 5,000-hp. units were placed in operation on the Texas-California lines and eight more installed within the next 2 years. Since the first operating models of the turbine, important design changes have increased its efficiency and made it a strong competitor with other type drives.

Major Crude Lines

Multiple ownership of crude pipelines, somewhat uncommon in prewar years, became the controlling factor in postwar, big-inch construction. As early as 1930 the use of 6 and 8-in. pipe was being abandoned in favor of the more economical 10 and 12-in. and engineers were well aware of the economies to be expected from a large crude line. However, few companies could have marshaled crude reserves or committed capital for a big-inch line at that time. In addition, available equipment and construction methods then in use made the initial cost of a large-diameter oil line prohibitive.

By 1945, however, the industry was ready for private construction of large lines. The demand existed, the equipment was available, and there was ample know-how from the wartime big-inch project. The major problems of financing and crude reserves were solved in many cases by joint-ownership arrangements, similar to that of the Bayou products system, mentioned previously.

One of the first such postwar ventures was that of The Texas Co., Shell, Sinclair, and Empire Pipe Line Co. in joining to build the Basin Pipe Line System. The system's trunk line was constructed in 1948 from Jal, N. M., through producing areas in West Texas and on to Cushing, Okla., where it contacted the Ozark Pipe Line Co. Size of the pipe ranged from 20 to 24 in. and the original capacity was 190,000 bbl. per day.

Constructed at about the same time was the 20-in., 102,000-bbl. per day carrier of Magnolia which extended from Corsicana to Patoka, Ill. All stations on this line were equipped with electric-centrifugal units, making it one of the first big lines to be operated entirely by electric power.

In 1949 Sun Oil Co. and Standard Oil Co. of Ohio formed the Mid-Valley Pipe Line Co. and started construction of a 20 and 22-in. line from East Texas to Ohio. Most radical innovation in the over-all design of this 1,000-mile line was the inclusion of microwave and VHF radio for dispatching and maintenance operations. This marked the first use of microwave for crude pipelining.

In 1952, following the general trend of large-capacity lines, seven companies joined to form the Rancho Pipe Line System and constructed a 455-mile, 24-in. line from McCamey to Houston. For a short time upon completion in early 1953 it was the state's largest, having a throughput of 208,000 bbl. per day. Companies in the project were Shell, Sinclair, Phillips, Pan American, Crown Central, Ashland Pipe Line Co., and Nantucket Pipe Line Co.

Design of stations included the best features of both manually operated and fully automatic stations. Push-button control for all valves, motors, flow regulators, etc., were added for better operation and personnel convenience. To each station 40 safety devices were incorporated to protect equipment against motor overload, hot bearings, low-suction or high-discharge pressure, seal leakage, pump vibration, etc.

Largest crude line . . . In 1953 the country's largest-capacity crude line was completed; this was the 26-in., 465-mile line of West Texas Gulf Pipe Line Co. from Colorado City to the coast near Beaumont. This company is another joint-ownership firm with the participants being Gulf, Sun, Pure, Cities Service Pipe Line Co., and Sohio Pipe Line Co.

When installed the line's capacity was 301,000 bbl. daily but with the addition of intermediate booster stations, this figure can be raised to a maximum of 440,000 bbl. Besides the 26-in. line, the system also includes a 112-mile, 20-in. spur from Wortham, in East Central Texas, to Longview for deliveries into the Mid-Valley system. Thus, it is extremely flexible in that crude can be delivered to Ohio refineries via Mid-Valley, to eastern refineries by tanker, or direct to refineries on the Gulf Coast.

Storage facilities with a combined capacity of 3,800,000 bbl. were built in conjunction with the line. Ten feeder lines for the large carrier were constructed into the Colorado City terminal, ranging from 6-in. lines to Mesa Pipe Line Co.'s 24-in. from Midland.

Reduce Pulling Costs...

due to ball and seat failure—Specify Carboloy® cemented carbide balls and seats

Increase your down well pumping equipment life as much as 20 times with Carboloy cemented carbide balls and seats.

The built-in wear-resistant capabilities of this metal make it especially effective in combating the acids and abrasive sands found in crude oil. This resistance to corrosion-erosion is unequaled.

Exceptional resistance to fluid wash, cuts, ball pounding and abrasive wearing is assured by 29 quality control checks performed during manufacture. Result: a uniform high-density ball and seat which maintains sphericity under even the severest impact and pressures.

Specify Carboloy cemented carbides when ordering balls and seats from your equipment manufacturer or oil-field supply store. Take advantage of the quality and wearability built into this product. For technical assistance or information on applying this wearproofing metal to other oil-field uses, please send coupon or have your equipment supplier contact us.

Other Carbide Applications:

CHECK VALVES

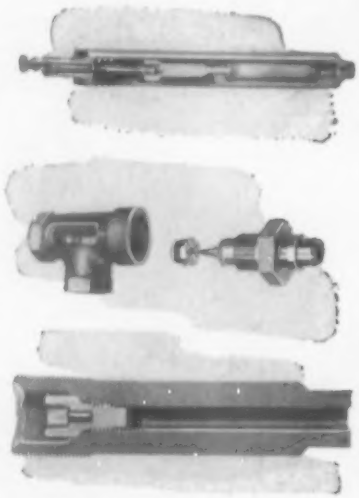
Gas-lift flow valves, wearproofed with Carboloy cemented carbide, showed no signs of wear after 9 months of continuous operation on a 3600-ft. well, operating at 400-500 B.P.D. rate and 450 PSI pressure. Well fluid was approximately 90% sand-bearing salt water.

MOTOR VALVES

Motor control valves with 18-8 stainless-steel stems and seats required replacement every 7 days because of abrasive wear. Stems and seats protected with Carboloy cemented carbide required *no service after 17 months of use.*

FLOW BEANS

Carburized-steel flow-control chokes (used in Bonnie View Field) had to be replaced every 24 hours because of abrasive wear. Flow control chokes made of Carboloy cemented carbide gave continuous service for 18 months, with no shutdowns for choke replacement needed.



"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11181 E. 8 Mile Blvd., Detroit 32, Michigan

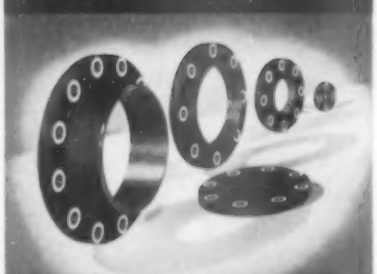
We want to use Carboloy cemented carbide on _____
Our equipment supplier is _____
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

HALLMARK OF *Quality*

IN PIPE COUPLINGS AND PIPE FLANGES

Made to A.P.I. and A.I.S.I. Specifications

HARRISBURG SEAMLESS STEEL PIPE COUPLINGS



Manufactured to A.S.A. Standards

HARRISBURG DROP-FORGED STEEL PIPE FLANGES

CONTACT THESE DISTRIBUTORS

HOUSTON
Henry H. Paris, Distributor, Inc.
LOS ANGELES
Howard Supply Company
TULSA
W. C. Norris, Manufacturer, Inc. (Couplings)
TULSA
Ardun Supply Company (Flanges)

HSC-PP-2/54

101 YEARS IN PENNSYLVANIA'S CAPITAL

Harrisburg Steel CORPORATION

HARRISBURG 6, PENNSYLVANIA

Mesa is owned by the same companies as West Texas Gulf but ownership percentages are different.

Stations are equipped with centrifugal pumps driven by totally enclosed, fan-cooled motors, the largest being 2,000-hp. units. Line and manifold valves and all auxiliary equipment are motorized and a great number of automatic safety devices have been installed. Pneumatic controls provide continuous pressure and flow regulation.

The trend toward automatic equipment and full utilization of engineering know-how is exemplified by the control system in use by West Texas Gulf. One of the most important functions of the system is the guarding of flow rate. Without some form of regulation, station startups into a slack line would result in high flow rate and excessive motor-load-current. In large electric installations such as these, excessive currents, even for very short periods, severely tax the electric supply system. Consequently, power companies impose heavy penalties for above-normal kva. demand.

To avoid these extra charges a control system has been provided which closely governs flow rate under all conditions. Its operation under slack-line condition is to throttle the outbound stream so as to keep throughput at a nominal value. As soon as the line is packed and flow rate begins to decrease, the throttle valve is automatically opened at a slow rate until the station is fully on line. Under normal running conditions a sudden decrease in pressure, indicating a line break, will cause almost instantaneous operation by the control system to shut the station down.

Mentioned here have been only a few of the more spectacular big crude lines. The magnitude of this type construction is better shown by the fact that of 29,000 miles of crude trunk lines in Texas in 1953, more than 3,000 miles were of 16-in. or better.

Unsung, but as important as any part of the story, are the many miles of small-diameter trunk lines and field gathering lines. In 1953, field gathering lines, including those for natural gasoline, accounted for 23,800 miles of pipe in the state. Most of these lines are of small diameter, 4 and 6-in., but some gathering systems of 14-in. pipe have been built.

The "small diameter" trunk lines still constitute the backbone of crude transportation within the state, amounting to 26,000 actual miles, or 20,000 miles on a basis of equivalent 10-in. pipe.

Products Lines

As the Big-Inch affected crude-line construction, so did the wartime products line influence this type construction. Success with the 20-in. and the Bayou pipeline are reflected in the general trend since the war of longer, larger products lines.

Humble started the first sizable post-war line in 1946, laying a 276-mile 8-in. from its Baytown refinery to the Fort Worth Dallas area—the first products line from the coast into North Texas. Particular care was used during construction to assure a long, trouble-free life. Double coating with enamel, use of glass-coating reinforcement, and complete holiday detection are examples of the care with which this line was installed. Cost of the project was in excess of $4,000,000; completion was in mid-1947 with initial throughput of 15,000 bbl. daily.

The Texas Co. and Magnolia began construction of products lines shortly afterwards. Magnolia built a 12-in. products line from Beaumont to Hearne in 1948 and The Texas Co. a 10-in. from Hearne to Dallas the same year.

More recent and most spectacular example of modern products-line construction is that of the Evangeline Pipe Line System, a 16-in. line from Port Arthur to Baton Rouge, La. This line, built in 1953, is jointly owned by Gulf, Sinclair, and The Texas Co.

Featured in its design is an automatic booster station at Lake Charles, La., which is controlled from Port Arthur by carrier-frequency signals transmitted over regular communication lines.

Problems in products-line operation which were very serious before the war are of much less importance in the modern industry. Internal corrosion is being prevented by wide use of inhibitors. The scale problem, which caused much trouble with pumps, valves, and meters in the past is now being solved with better filters, more frequent scraper operation, and use of magnetic traps for the ferrous particles.

Accurate detection of batch interfaces, long a difficulty in products operation, is now possible with the use of new electrical instruments which detect the change in stream dielectric strength as the interface passes.

New Equipment and Trends

The ability to keep constant and reliable contact with all parts of extensive systems has always been of extreme importance to pipeline operations. Thus, the industry was quick to adopt VHF radio in 1945 for use in maintenance and dispatching operations and by 1950 almost all companies in the state had installed VHF equipment. Use has been so widespread that now it is difficult indeed to place a new license on a frequency within petroleum-industry bands and not cause interference with other users.

Microwave, first introduced in 1949, is being used extensively by the pipeline industry in Texas. The new method of communication adapts itself very readily to the present trend toward remote control and telemetering and is being used for this purpose as well as for voice transmission.

Humble pipeline operates the longest microwave system entirely within the state. This system, extending from West Texas to Houtson, is used for dispatching and telemetering but no automatic operation.

Pan American Pipe Line installed the state's first pipeline station for remote control by microwave. This installation is in Pan American's West Texas system and was placed in operation in 1951.

Other operators of microwave in the state are Transcontinental Gas, Texas Illinois, Mid-Valley, Texas Eastern, and Trunkline Gas Co. At present time the pipeline industry is operating more than 1.5 times as many miles of microwave as all other users combined, with a sizable percentage of the mileage being in Texas.

Automatic gaging . . . Automatic gaging of liquid level has progressed to the extent that its use is now being considered for custody transfer. When properly maintained, the automatic tank gage in use today gives results which are fully as accurate as those obtainable by hand gaging.

Determination of temperature of oil in storage, long a knotty problem for the industry, is now being done accurately and rapidly by use of a recently developed electrical system. Basically the system consists of a group of different-length resistance wires which are suspended within the storage tank and means for connecting these wires to a remotely-located resistance bridge.

Because of the different lengths, the operator may always pick a wire that is completely submerged in oil. Thus, the wire resistance, which is indicated on a meter calibrated in degrees Fahrenheit, varies directly as the average temperature of the stored oil.

The system is capable of determining oil temperature more accurately and with more rapidity than is possible with hand methods. It is also being considered for use in custody transfer.

Humble Pipe Line was the first company to install such a system in Texas, using it at its Webster terminal.

Metering of pipeline streams, used for many years in products lines, has only recently been accepted for crude service. Magnolia Pipe Line made the first use of meters on a big line, installing them on the 16-in. Ringold-

A PAGE FROM THE AERO *Commander* CUSTOMER LIST

IBM
TRADE MARK

Old Spice

MARATHON

ENDICOTT JOHNSON

Mobilgas

RAYTHEON

CHEROKEE TEXTILE MILLS

Carleton Putnam

JOHN DEERE
QUALITY FARM EQUIPMENT

STATES OIL COMPANY

Thompson Industries, Inc.

General Steel Steel Corporation

AURORA GASOLINE COMPANY
Refiners and Marketers

SPERRY

Clemson Bros., Inc.

Harold S. Vanderbilt

R. D. KEENE
CITRUS FRUIT GROWING — CATTLE RANCHING

STACKPOLE
ST. MARYS, PENNA.

OK BRAND

CLARK compressors

REA

AIR ASSOCIATES, INC.

GERSTENSLAGER
CUSTOM BODIES

SEWERS INC

Riviera

LUHR BROS., INC.
GENERAL CONTRACTORS

PTL 6
TRADE MARK REGISTERED

GODFREY CONSTRUCTION CO.

a nose for

The Chicago Tribune

wilcox
ELECTRIC COMPANY, INC.

SHEA CHEMICAL CORPORATION

ANDERSON DUNHAM Concrete Co. Inc.

LAM Enterprises Inc.

SPINDALE MILLS, INC.

J. E. Greiner Company
CONSULTING ENGINEERS

BRITAIN
ELECTRIC CO.

GUST K. NEWBERG CONSTRUCTION CO.

SIGNAL
OIL AND GAS COMPANY

Paymaster FEEDS

HASKINS & COMPANY

PHILLIPS DRILLING CORPORATION

RAY-O-VAC

TRECO

APPLE VALLEY
CALIFORNIA
BUILDING AND DEVELOPMENT CO.

W. E. BAKKE OIL CO.

CHINOOK FLYING SERVICE LTD.

Gaseteria

SPENCER

G.H. GODSALL
EQUIPMENT

AMIS
CONSTRUCTION COMPANY

Compton, Inc.

business

AERO DESIGN Commander
AERO DESIGN AND ENGINEERING COMPANY
TULAKES AIRPORT • P. O. BOX 118 • BETHANY, OKLA.

Corsicana line. That company has announced that meters will also be used on the Corsicana - Beaumont 20-in. crude line that is to be completed this summer. Use of meters for this project will reduce the amount of tankage necessary to handle the line's stream.

Texas Drilling— A Study in Contrasts

(Continued from page 157)

satisfactorily under a chert bit have not been definitely correlated, they probably can be anticipated once found in a given field.

In development drilling, where the chert conditions are known, few contracts make special provision for the rig time while penetrating chert. However, almost all wildcat contracts call for the operator to pay day rates after a certain length of chert-drilling time, usually 24 hours.

From a rate-of-penetration standpoint, water has long been regarded as the best drilling fluid, with the exception of air or gas. While drilling with water is not feasible in some areas, West Texans are finding that penetration with water is usually so much better there, that most delay "mudding-up" until definitely reaching formations which present hydration problems.

Not all of today's West Texas drilling is deep. In fact, as many wells are bottomed at depths of less than 5,000 ft. as are drilled to greater depths. These shallower wells are completed in Permian zones such as the Yates sand, the San Andres, the Clear Fork, etc. The Ellenburger, Strawn, Marble Falls, etc., are the usual targets of the deep drilling.

The excellent completions from the Cambrian sands in Coke and Nolan counties probably mean greater average well depths for West Texas. Many wells encountering water in the Ellenburger will likely be deepened into the Cambrian for testing, instead of being abandoned immediately as in the past.

North-Texas Drilling

North Texas is independents' country, for the most part. Leases generally are small, producing depths are relatively shallow, and production per well is not large.

Drilling is characterized by numerous holes to about 2,000 ft., and rigs used here are very light rotaries, or cable-drilling machines. However, in this same territory medium-weight rotaries are used to drill to approximately 5,000 ft. to test the Strawn and Ellenburger.

Grayson County is exciting more interest than any other single county in the area at present. Drilling is deeper there and more difficult; however, productive sands are more numerous. One recent well in Grayson County encountered 13 productive sands, mostly in the Strawn group. Dual completions are being made in many cases, as the pays range from 3,000 to 12,000 ft.

Grayson County is one of the few parts of North Texas where crooked-hole tendencies are serious. One company there reports using 7-in. drill collars in 7⅞-in. hole to prevent excessive hole deviation. Jet bits are used extensively.

It is likely that an increasing amount of North Texas drilling will be done in connection with water-flood operations. One of the oldest of North Texas fields, Burkburnett, and several others are now getting under way and many more are planned for the near future.

In East Texas . . . Scattered field wells with a few deep wildcats is the drilling picture in East Texas at present. Contractors find the digging in most areas relatively easy, but recent deeper wildcats testing the Glen Rose, Paluxy, Travis Peak, etc., have encountered more difficult drilling. Strong salt-water

even a **FIELD MOUSE** knows the difference!

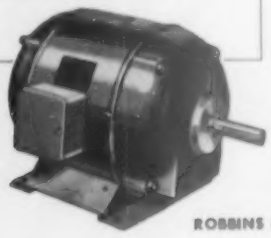
There's an R & M "All-Weather" Motor that's built for YOUR job!

Triple-Rated—for changing power needs. Slight additional cost is quickly written off by power savings. You buy power only for the connected horsepower you need. As requirements change, you change the horsepower—*without changing motors.*

High Slip—ideal for the reciprocating load requirements of oil pumping.

High Torque—to meet heavy starting problems.

Standard Integrals—from 1 to 125 horsepower.



If ever a motor riled a rodent, it's the R & M "All-Weather" motor! Pack rats, snakes and field mice just can't get inside—because all R & M motors are rat-proofed at the factory, *at no extra charge!*

And, that's only one of many R & M features that save you money . . . *exclusive* features such as:

- Full-height end-heads to protect internal parts of motor against damage.
- Special treatment to resist moisture and corrosion.
- "Clean-Sweep" ventilation for cool running.
- Extra-large, factory-lubricated sealed bearings; forget 'em for at least 5 years.

Even with all these features, R & M motors are sold at a standard motor price. One trial, and you'll agree they're the finest your money can buy!

Write for bulletin—"Oil Field Motors"

It has valuable data on construction, service and specifications. Write for your free copy—and name of your nearest R&M distributor. Robbins & Myers, Inc., Motor Division, Springfield 103, Ohio.

R&M *"All-Weather"* *Oil Country* **MOTORS**

ROBBINS & MYERS, INC. • Springfield 103, Ohio • Brantford, Ontario

"All-Weather" is a Robbins & Myers, Inc. trademark

READ HOW you get split-second mud control—and save up to $5,000 per year on maintenance—with a LIGHTNIN Mud Mixer like this.

MIX MUD in a FEW SECONDS with a fraction of the power you use now

SPLIT-SECOND control of mud condition! That's what you get with a fast new mixing method, proved now on nearly 100 rotary rigs.

You can mix mud to just the weight and viscosity you want—so fast you won't believe it until you see it work.

You can do it with a small fraction (as little as one-tenth) of the horsepower normally used for mixing mud.

And you can save up to $5,000 per year on maintenance of your mud mixing equipment! Results prove it.

Heavier mud—in seconds. To keep mud uniform, you just use one (or in large installations two) LIGHTNIN Mixers—self-contained units specially designed for this job.

To get heavier mud, you flash-mix weight material into the mud entering the tank or pit. Flash mixing is done by a small high-speed LIGHTNIN unit, mounted at the inlet.

Mud is then circulated rapidly and uniformly throughout the tank or pit by a turbine-type LIGHTNIN Mixer mounted over the mud.

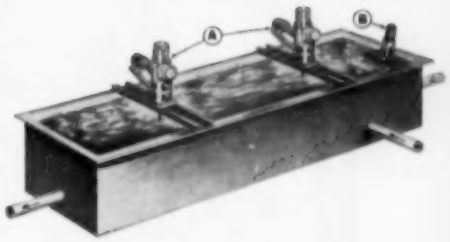
You can add weight material sackful after sackful—as fast as you want to dump it in. You get an *immediate* rise in weight, throughout the whole mud system. A few seconds is all it takes to increase weight of every gallon of mud by the exact amount you want.

You get immediate dispersion of gel ingredients—and in 20 minutes you get fully uniform viscosity.

You keep the entire contents of your mud tank or pit in a perfect state of mix—ready for instant use. Mud characteristics stay *constant*—right where you want them, for best drilling. No mud settles out in the corners of the tank or pit. This saving in mud cost, alone, has amounted to thousands of dollars per location.

Make savings like these. On a new rig, you can eliminate the entire cost of a standby pump, its prime mover, and component piping for jetting mud.

On any rig, new or old, you save *two-thirds or more* what it costs you now to replace pump parts, valves, and fittings worn out in mud agitation service. The only parts in contact with mud are the LIGHTNIN Mixer impellers—built to resist abrasion, yet easily replaced at any time for a fraction of your present maintenance cost.



UNIFORM MUD—in a hurry. Weight and gel dumped in at the LIGHTNIN Flash Mixer (B) are distributed through mud IN A FEW SECONDS by one or two turbine-type LIGHTNIN Mud Mixers (A).

And you can cut your power consumption by about 90%, as compared with conventional mud agitation methods! The entire mixing job takes only 10 to 25 horsepower, depending on size of your tank or pit.

See for yourself. LIGHTNIN Mud Mixers are unconditionally guaranteed to do the mixing job *right* for you. But don't take our word for it—*see for yourself* what LIGHTNINS are doing on rigs in your part of the country. Your nearest LIGHTNIN sales engineer will gladly arrange a demonstration for you—without obligation, of course.

For details, write or wire us today.

Get the FREE FACTS on LIGHTNIN mud control

This illustrated folder, sent you without cost or obligation, tells in 6 minutes how you control mud with LIGHTNIN Mud Mixers. Send the coupon for your copy today.

Lightnin® Mixers™

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc.

174-e Mt. Read Blvd., Rochester 11, N. Y.

In Canada: William & J. G. Greey, Ltd., 100 Miranda Avenue, Toronto 10, Ont.

Please send the FREE 6-minute picture story on cutting costs with LIGHTNIN Mud Mixers.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

flows are reported in the Sabine County area.

Lost circulation, while not usually a problem in most of East Texas, has presented itself in some of the 5,000 to 8,000-ft. holes as a result of heavy muds. Success is reported, however, with conventional lost-circulation materials.

Panhandle

Fast, straight hole is the rule, rather than the exception in the Texas Panhandle. Currently, the bulk of Panhandle drilling is confined to Carson, Gray, Hutchinson, Moore, Potter, and Roberts counties, but Hansford County is showing a greatly increased activity in deep drilling.

Crooked-hole tendencies are ordinarily of no concern to Panhandle contractors, and most of the drilling is by rotary rigs. However, many shallow holes are being drilled with cable tools; and many other wells are still completed with cable tools after a rotary has set the oil string.

In Panhandle drilling lost circulation is not usually a serious problem. However, it does occur occasionally when mud weight builds up excessively because of drilled solids and dissolved salt.

The thick, relatively shallow salt beds often cause the p.p.m. chlorides of the drilling fluid to approach complete saturation. Moreover, surface water is extremely scarce so that dilution of the mud to control salt content is usually a difficult and expensive problem.

Sometimes, water for drilling is obtained from shallow sloughs and ponds in the area. Very often, however, the operator finds it necessary to pay to have water hauled in by truck.

Other difficulties . . . Besides the shortage of water, there are two other factors which keep the contractor in the Texas Panhandle from showing more profit. These are the rapid corrosion of drill pipe and the problems resulting from the shallow unconsolidated sand formations underlying much of the area.

In this country where many wells are completed in as little as 6 or 7 days, the pipe is out of the hole for a large percentage of the time. Exposed to atmospheric oxygen and coated with high-salinity mud, the drill pipe and drill collars corrode rapidly while lying on the racks.

In the event circulation is lost, as sometimes happens, the unconsolidated sand can slough into the hole. Stuck pipe is quite often the result; and fishing, itself, becomes risky because of the danger of sticking washover pipe.

There is also a tendency for the sand to become suspended in the mud. As a result, pump liners are cut out quickly, bits erode, and bit bearings fail prematurely.

Completion in dolomites . . . In the past, wells that were completed in the Brown and White dolomites of the Panhandle had the oil string set above the pay. Completion was made in open hole; either acidizing or shooting with nitroglycerin was then employed to stimulate production.

However, the success of hydraulic fracturing in many fields of the Texas Panhandle has made setting pipe through the pay more common. Notable production increases have been achieved in some cases with the use of the high-injection-rate, large-volume fracture treatments that were introduced in the Spraberry Trend.

One novel completion practice is having an increasing popularity in the Pampa area. Paraffin solvent is pumped into the hole and allowed to stand in contact with the formation face for 2 or 3 days. A variation of the same principle is to circulate the solvent for a similar length of time. Stabilized production increases in the order of 100 to 200 per cent have been common after these treatments.

TEMPERATURE PROTECTION

Mercoid Remote Stem Temperature Controls are extensively used on major pipelines throughout the oil industry.

Wherever low or high temperature conditions are encountered, such as in pump cases—in motor and pump bearings—in speed increaser lube oil systems—or in many other vital locations — Mercoid mercury switch equipped controls are constantly on guard.

Let Mercoid solve your temperature control problems

THE MERCOID CORPORATION, 4201 BELMONT AVE. CHICAGO 41, ILL.
205 E. 42nd St., New York • 3137 N. Broad St. Philadelphia

Another of 15 reasons why **REED** tool joints last longer!

"TAILORED" HEAT TREATMENT

FROM this control room, the heat treat foreman "tailors" the treatment of each batch of **REED** Tool Joints to fit the exact physical characteristics of the heat of steel from which they are made.

This "tailored" heat treatment results in tool joints that are tougher, safer and longer wearing than they would be if standard AISI specifications were used for all heats.

Such extras as "tailored" heat treatment are extra trouble for **REED** production and inspection departments—but they are important reasons why **REED** Tool Joints have the strength, toughness and wear resistance to give longer life with safety.

PESA

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

4/62

15 reasons why **REED** tool joints last longer!

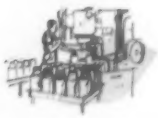
Advanced design. The list of **REED** tool joint developments is assurance that **REED** Tool Joints contain all the latest improvements in design.

Chemical analysis of every heat of steel is checked by spectrograph.

Strength and toughness of every heat of steel are determined by three different testing machines.

Grain structure and grain flow are checked by microscope. **REED** Tool Joints meet the very highest standards.

Hardenability tests are made and form the basis for the "tailored" heat treatment of tool joints made from different heats of steel.



Precision machining is accomplished by specially designed automatic machines.

Jigs and fixtures of the highest precision assure perfect alignment and concentricity of **REED** Tool Joints.

Thread comparator checks hob used to cut **REED** Tool Joint threads, assuring accuracy of thread form, lead and taper.

Automatic heat treating furnaces—especially designed for the job—heat tool joints to utmost precision in a carefully controlled atmosphere.

This central control room enables the heat treat foreman to "tailor" the treatment of each heat of steel to extreme accuracy.

Precision quenching and drawing complete the "tailored" heat treatment that gives the best combination of strength and toughness to every tool joint.

Hardness testing is final assurance that every **REED** Tool Joint is strong and tough.

Tool joint threads are treated to prevent galling during breaking-in. Complex metal phosphate coating acts as a pre-lubricant infused into the threads.

"Reedite" hard facing—available on order—is factory applied to resist abrasion better and make tool joints last longer.

These hand gauges, plus comparators, master gauges, profilimeters, magnaflux and other machines, are used to make the 120 inspections each tool joint must pass.

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

Texas Eyes Offshore Prize

(Continued from page 154)

being used by Kerr-McGee Oil Industries, Inc., in Louisiana. This firm is reported also constructing a bigger barge of similar design which can drill in 60 ft. of water. Its design will be based on the same general principles of the existing unit, which Kermac purchased from the old Barnsdall Research Corp.

The barge is lowered to the bottom of the water by means of flooding, and the large barge now building will be sunk in much the same manner. However, it will be fitted with pontoons on each side, to aid stability in raising and lowering. Bearing pressure on the soil will be controlled by ballasting the lower hull compartments, and adjusting force on the pontoons.

. . . 2. A novel barge which sinks its own engine room to the ocean floor. Engines, cementing equipment, and mud pumps are located in a lower hull section and all is sunk to the ocean floor by the ballasting principle. The diesel-electric drilling rig is contained on the upper deck. It is now undergoing final fitting and is owned by Ocean Drilling & Exploration Co., which will use it on a contract-drilling basis. The barge is said capable of drilling in 40 ft. of water *(The Oil and Gas Journal, February 8, page 96)*.

. . . 3. A mobile platform to be used for deep-water drilling (in up to 100 ft. of water). Now being built by Bethlehem Shipyards in Beaumont for G. C. Glasscock Drilling Co., of Corpus Christi *(The Oil and Gas Journal, April 26, 1954, p. 125)*, this unit consists of a lower hull, 106 by 80 ft., and an upper hull, having an 80 by 50-ft. platform. When towed to location, platform piling is dropped to the bottom and forced into the subsoil by means of hydraulic jacks.

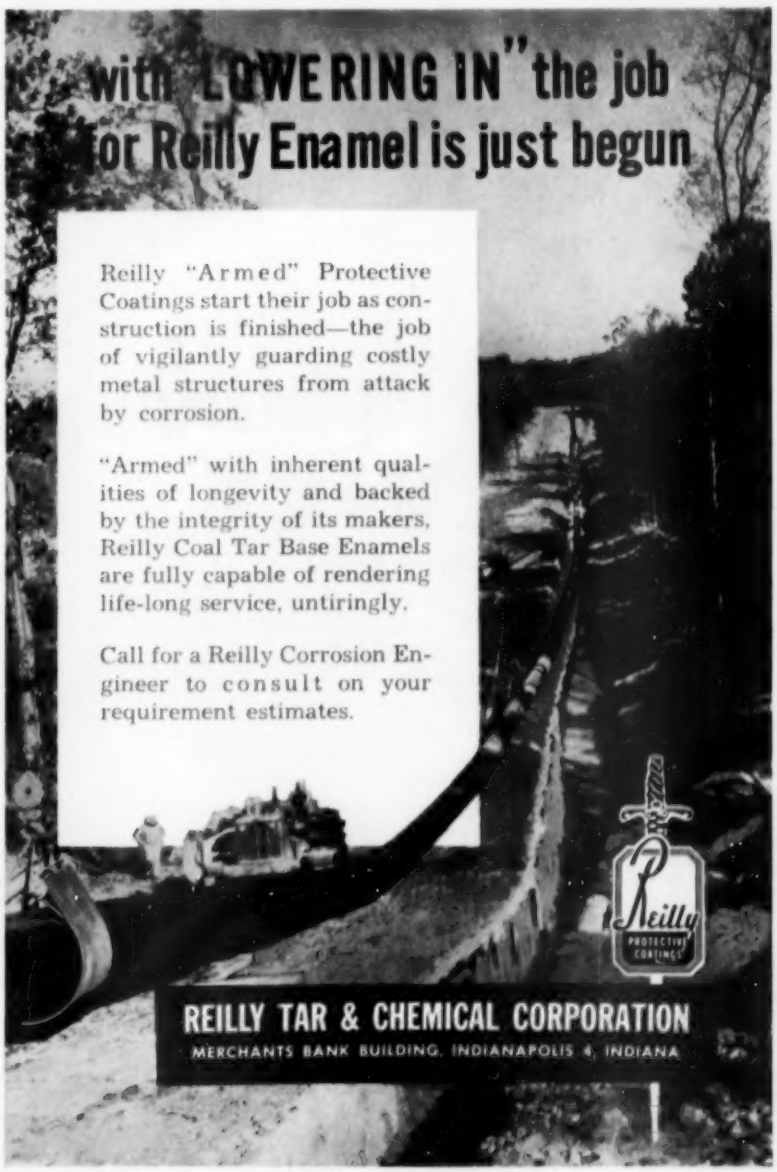
Others . . . These are but three of the types of "fantastic" equipment units being built at this time. There are other radical new ideas. For instance, a Houston man has designed a barge unit which he claims can drill in waters of **any** depth. A unique sideboom arrangement enables the barge to be sunk gradually to the ocean floor while remaining on an even keel, and he isn't worrying about the center of gravity, for huge flaps, or wings, on three sides take care of this problem. The wings are buoyant while moving to location, and are sunk to the floor with the barge to provide additional bearing surface.

In addition to the novel submersible barges designed to drill in deep water, the conventional drilling platform is again slated for heavy use, particularly off the Texas Coast. As has been pointed out, this probably is because the many new ideas in equipment are not yet available to the average company or group of companies, and they are going ahead with plans to erect platforms. One major company is debating whether to order a new-type submersible barge, or build a regular platform out in the gulf.

Companies Entering Play

Various operators have revealed plans to drill in the Texas tidelands, since the record-breaking lease sale of December 1, 1952. Here is what some of them plan to do:

. . . Gulf Oil Corp. This company paid more than $3,000,000 for one block of acreage off Mustang Island, and plans to spud in its first test around June 1. Indications are that Gulf has found a new structure, for it has conducted extensive seismograph operations in the area. Prolific multizone production lies to the west of Mustang Island, but this field, developed by Sunray Oil Corp., Atlantic, Renwar Oil Corp., and others, has been thoroughly defined on the east. Water over Tract L-774, where Gulf will drill shortly, is about 60 ft. deep. The company has not disclosed what type of equipment it will use, although it is understood that a modified template-type platform will be used in this particular area.


with LOWERING IN" the job
for Reilly Enamel is just begun
Reilly "Armed" Protective Coatings start their job as construction is finished—the job of vigilantly guarding costly metal structures from attack by corrosion.
"Armed" with inherent qualities of longevity and backed by the integrity of its makers, Reilly Coal Tar Base Enamels are fully capable of rendering life-long service, untiringly.
Call for a Reilly Corrosion Engineer to consult on your requirement estimates.
Reilly
PROTECTIVE COATINGS
REILLY TAR & CHEMICAL CORPORATION
MERCHANTS BANK BUILDING, INDIANAPOLIS 4, INDIANA

the Sign of Dependable
SERVICE

ON OIL FIELD SUPPLIES

The men in the field who rely on United Supply will tell you that there's no finer or more dependable service ANYWHERE! United Supply's conveniently located stores,—fast, reliable service anywhere at any time and nationally known quality products all add up to best supply service in the industry. Let United Supply show you the way to cut down time to the bone . . . Just call us on your next supply problem—or visit your nearest United Supply Store.

UNITED SUPPLY

AND *Manufacturing* COMPANY

TULSA, OKLAHOMA

Stores in: KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO

COURTESY • SERVICE • DEPENDABILITY

Two tender ships have been built for Gulf and are to be used in connection with the offshore-drilling work off Mustang Island.

... Stanolind Oil & Gas Co. This company has held onto its offshore leases in the Texas tidelands since 1947. Recently, Stanolind became the first to reveal plans to drill on the government-controlled areas of the outer Continental Shelf. Stanolind is now drilling from a template-type platform in Block L-141, State Lease 31,592, lying 25 miles due east of the city of Galveston and 19 miles from the nearest land. The first formal application to the Interior Department in Washington for permission to drill on the government tidelands was made by Stanolind several months ago. Stanolind's block carries the government classification, "OCS-0273," the "OCS" meaning "on Continental Shelf."

The company's platform is 83 by 82 ft., and will stand in 50 ft. of water. The platform was moved to location the last week in April, after a simulated platform was tested at South Houston field. Stanolind is contracting its work, but has its own tender ship, a converted LST which will be used in connection with the venture off Galveston Island.

... Standard Oil Co. of Texas. This company has extensive holdings off Kleberg and Jefferson counties and will drill from platforms. Most of its activities will be within the 3-mile limit, on smaller tracts, but one of its operations will be carried on off Padre and Mustang islands, where water is about 45 ft. deep, however.

Standard of Texas spudded in its first offshore test, which became the first tidelands venture for South Texas, on April 14. Location is 1½ miles east of Padre Island, in about 45 ft. of water. The well is being drilled from a permanent-type platform.

... Sun Oil Co. An extensive drilling program is planned by Sun Oil off both Mustang and Padre Islands, Nueces County. Sun will work in both shallow waters adjacent to the island, and in 45-ft. waters of the gulf out to about 4½ miles from shore. Platforms to be used are of standard design, 52 by 106 ft., and will stand 37 ft. above mean low water.

... Humble Oil & Refining Co. This company, failing to find any commercial oil or gas production off the Texas coast during its early tidelands activity, revealed recently that it will drill two wildcat tests off the South Texas coast during the remainder of this year. The two tests, one to be drilled off Aransas County and the other off Nueces County, will be located on lands which were acquired by Humble during the December 1, 1953, sale of tidelands leases.

The two tests, one slated for 13,000 ft. and the other for 8,000 ft., are part of the company's over-all plan this year which includes $14,000,000 in expenditures in the Texas and Louisiana tidelands.

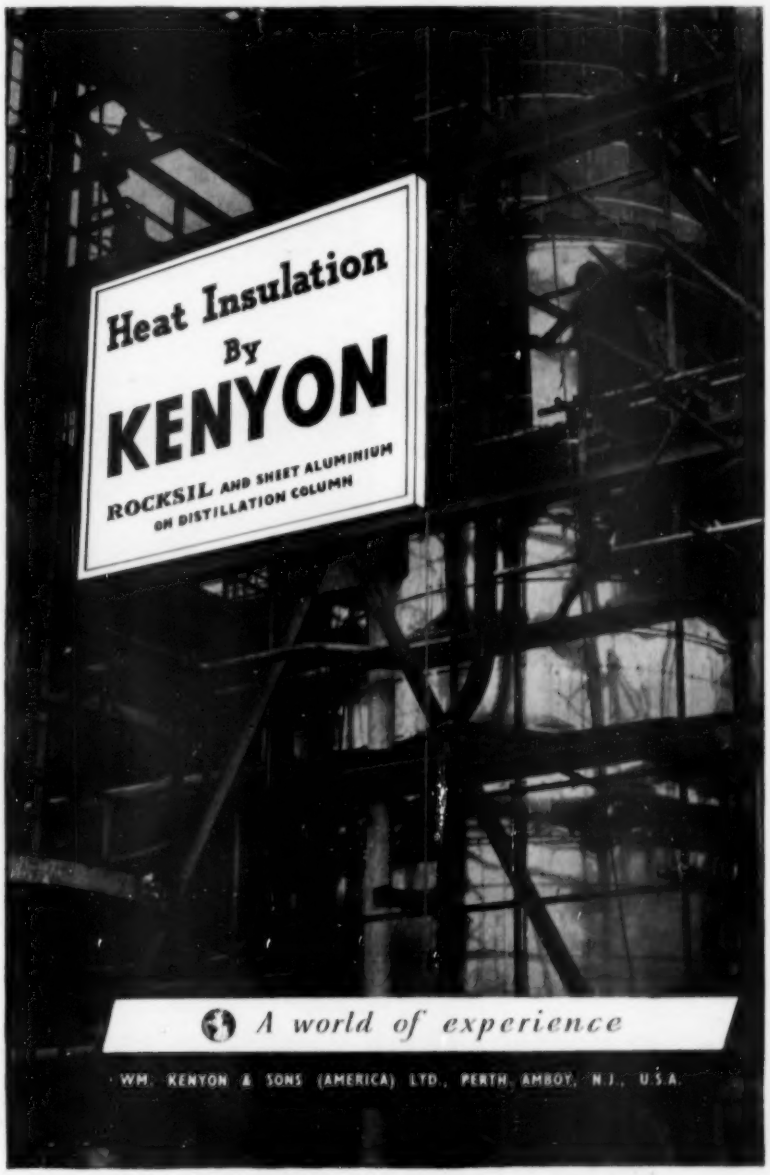
In addition, Humble is to drill three 14,000-ft. wildcats off the Louisiana coast and 14 development wells in the Grand Isle area.

All of Humble's offshore plans this year call for the use of template-type drilling platforms.

... The Texas Co. Texaco recently announced that it was staking its first tidelands test, off the coast of Galveston County. Studies are being made at this writing on whether or not to utilize some new barge-type unit, or go to the regular permanent-type platform. Water over State Tract S-137, where the initial well will be drilled, is about 25 ft. deep, and location is 4 miles from the south edge of High Island field.

At the time Texaco made its first announcement it was entering the tidelands, it said that "special equipment" would be used. No details have been released and later information indicates that Texaco may go ahead with Standard-type platform plans.

... Magnolia Petroleum Co. Magno-



WILLIAM KENYON & SONS, LTD., DUKINFIELD, CHESHIRE, ENGLAND KH 158C

lia acquired some choice blocks at the December sale, in areas adjacent to the big Gulf acreage off Mustang Island, and plans to drill from platforms, but no details have been announced yet.

Exploration groups formed . . . Two new groups have been formed by various operators within the past month, for the sole purpose of exploring for oil and gas in the Texas tidelands.

First of these groups was formed by Sinclair Oil & Gas Co., Standard Oil Co. (Ohio), El Paso Natural Gas Co., and Peoples Production Co., a subsidiary of Peoples Gas Light & Coke Co. of Chicago.

The other group is made up of Melben Oil Co., Ohio Oil Co., and Pure Oil Co., with the latter designated operator. This group is to drill immediately in an area off the Texas coast, 10 miles east of Galveston Island, on a block of 28,640 acres. Pure owns a half interest in this acreage. The group plans to use a conventional drilling platform, which will be fabricated on land and moved to the offshore site.

Tidelands contractors . . . Two companies have recently been formed to do offshore drilling on a contract basis, and each has a new-type submersible drilling barge under construction.

First of these companies formed for drilling in deep waters was Ocean Drilling & Exploration Co. (Odeco), of New Orleans. Its unique barge, already mentioned, will go in service late this summer. The other is American Tidelands, Inc., formed in Houston and New Orleans, and made up of a group of independents long familiar with drilling and producing operations. The company's new drilling barge is now being built and is scheduled to go into service in December. Both the Odeco and American Tidelands barges can drill in 40 to 45 ft. of water.

While the above-mentioned companies are admittedly a small percentage of the firms which are expected to enter the Texas tidelands picture, they are the only ones who have come out with any announcement of definite plans for the near future. They do not include those companies which operate entirely off the coast of Louisiana.

It must be reemphasized that the bulk of Texas' offshore work has been done in the inshore areas. In these shallow waters where small submersible barges can operate efficiently, most activity has taken place, and with good result. Many lush fields have been proved, among them Mustang Island and Redfish Bay. There are other successes in the shallow waters of Copano Bay, Matagorda Bay, and Laguna Madre, a shallow lagoon lying west of Padre Island, and in Galveston Bay. But these operations cannot be classified as real tidelands drilling.

Bay work . . . At one time the only real marine operation being carried on anywhere along the coast was that of Sunray Oil Corp., Atlantic Refining Co., and Renwar Oil Corp. in the big Corpus Christi-Redfish Bay-Mustang Island area.

Both Mustang Island and Redfish Bay fields have been proved in several zones, for oil and gas. Sunray and others pooled their gas sources into a recovery system, with Sunray the operator, and thus found a good outlet for the gas.

In addition, other companies have been active in inshore field activities in Texas: Glasscock Drilling Co., which punched down many of Sunray and Atlantic's Mustang and Corpus Christi Bay wells; Humble, British-American Oil Producing Co., Seaboard Oil Co. of Delaware, Sun, Shell Oil Co., Phillips Petroleum Co., Sohio Petroleum Co., Stanolind, Texaco, the H. L. Hunt Interests, Gulf, Brazos Oil & Gas Co., and others.

Pumps

. . . . FOR THE OIL INDUSTRY

Two C.M.C. Dual Prime Model 420 Pumps loading lub-oil for Mid-Continent Petroleum Corporation at Odessa, Texas

Exclusive twin priming advantages give C.M.C. Dual Prime Pumps longer life, minimum maintenance and outstanding operating performance.

They are simple, rugged, fool-proof—and every pump is tested under most severe conditions.

Automatic priming speed on lifts up to 25' is unmatched. Sizes 1½" to 10"—3,000 to 240,000 G.P.H.

Write today for full details — our qualified engineers will gladly help solve your pump problems.

CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA

500 Secondary-Recovery Projects Active in Texas

(Continued from page 164)

and between 392 and 509 producing wells on the eastern end of the field in Hockley County. Gas would be injected in a dispersed-type pattern into the San Andres formation at an average depth of 4,470 ft. Gas was selected as the injection fluid due to scarcity of water in the area. The project is expected to recover an additional 16,000,000 bbl. of oil.

All three of these mammoth projects will be in District 8.

West Texas, for various reasons, is the only area in the state which might some day conceivably pose a threat to North Texas' title as the region with the biggest number of secondary-recovery operations.

East Texas

Secondary - recovery operations in East Texas, comprising Railroad Commission Districts 5 and 6, are almost exclusively confined to water flooding. This is because there is a natural water drive in most of the reservoirs

At the first of 1954, the Railroad Commission listed 30 projects approved in the area—19 of them in District 5, 11 in District 6. In District 5, there were 14 water floods, 4 combination gas and water-injection operations, and 1 gas-injection project.

Twelve of the District 5 projects were approved by the commission between January 1, 1952, and January 1, 1954—seven of them in Corsicana Shallow field in Navarro County. Six of the 11 projects in District 6 are "new" ones.

Corsicana Shallow field, as indicated by the above figures, currently is the most active water-flooding area in East Texas. This, the oldest oil field in Texas, produces from the Corsicana sand encountered at 1,027 ft. The Corsicana is thought to be the equivalent of the Wolfe City sand which has wide distribution in the area. It has a gross thickness of about 50 ft. and an average effective thickness of about 26 ft. Porosity on the western side is erratic due to increased shale content, and this lack of porosity continuity is the main trap-forming feature. Strata in the area dip to the east at a rate of about 115 ft. per mile. There were 644 wells in the field at the first of 1952.

Though Corsicana field is most active, the sprawling East Texas salt-water injection project still is the biggest and most impressive.

The field, with productive acreage in Upshur, Gregg, Rusk, Cherokee, and Smith counties, originally contained about 135,000 acres, but water encroaching from the west has trimmed it to considerably less than 100,000 acres.

Through very close cooperation between the state and operators in the field, a program of water injection and production control has been carried out which it is believed will ultimately increase oil production from the field by a whopping 600,000,000 bbl.

The field produces from the Woodbine sand topped at 3,600 ft. It is located on the west slope of the Sabine uplift and the east side of the Tyler basin. A stratigraphic trap was formed where the Woodbine is truncated and pinches out updip against the Austin chalk. On the east production is limited by the pinchout, while the westward limit is determined by the water-oil contact. Thickness of the pay varies from 0 ft. on the east to 350 ft. on the west, and net effective thickness is about 51 ft. The field is roughly 43 miles long (north-south) and about 5 miles wide.

First salt water from the Woodbine was returned to the reservoir in June 1938. The East Texas Salt Water Disposal Co. was organized in 1942 to carry out injection on a field-wide basis for all operators. It is still carrying out the program except for a few isolated instances where operators are handling their own injection. All produced salt water is cycled back into the reservoir.

Original reservoir pressure was 1,620 psi. Pressure fell off until about 1941 where it has remained relatively constant at over 1,000 psi. ever since. The pressure reading as of April 1, 1954, was 1,029.07 psi.

It is estimated that more than 4,600,000 bbl. of oil has been produced from East Texas field for every pound of drop in reservoir pressure over the life of the field.

Texas Gulf Coast

In Districts 2 and 3, comprising the Gulf Coast area, there were a total of 52 secondary-recovery projects either active or approved by the commission at the first of 1954. Of the total, 29 were gas-injection operations, 18 were water floods, and 5 were combination projects.

There were 20 projects in District 2—14 gas-injection projects, 4 water floods, and 2 gas and water-injection operations. Of the 32 projects in Distric 3, 15 were gas-injection projects, 14 water floods, and 3 combination operations.

Eight of the 20 projects in District 2 and 13 of those in District 3 were approved by the commission in the 2 years up to January 1, 1954.

As in East Texas, many of the reservoirs have natural water drive.

One of the best-known and most notable projects on the Gulf Coast is that in Old Ocean field of Brazoria and Matagorda counties. It is estimated that this program, involving injection of residue gas into two of the four major producing reservoirs in the field, the Armstrong and Chenault, will result in the recovery of an additional 50,000,000 bbl. of oil and 20,000,000 to 24,000,000 bbl. of condensate. All production from the field is from the Frio formation of Tertiary age,

The Armstrong reservoir, encountered at about 9,700 ft., takes in about 14,500 productive acres. The 9,400-ft.

TEXAS SECONDARY-RECOVERY PROJECTS AS OF JANUARY 1, 1954*

	Type			Total Jan. 1, 1954	New projects†
Area—	Water	Gas	Water and gas		
North Texas	213	40	8	261	177
District 7-B	92	13	4	109	...
District 9	121	27	4	152	...
West Texas	85	40	6	131	80
District 8	79	26	6	111	...
District 7-C	6	14	0	20	...
East Texas	24	2	4	30	18
District 5	14	1	4	19	...
District 6	10	1	0	11	...
Texas Gulf Coast	18	29	5	52	21
District 2	4	14	2	20	...
District 3	14	15	3	32	...
Southwest Texas	33	70	13	116	53
District 1	6	5	2	13	...
District 4	27	65	11	103	...
Texas Panhandle (District 10)	2	21	0	23	5
Totals	375	202	36	613	354

***Approved by Texas Railroad Commission. †Approved by Texas Railroad Commission in 2 years ending January 1, 1954.**

Chenault pool comprises about 9,537 acres. Injection in both cases is into the gas cap.

Southwest Texas

The majority of the secondary-recovery projects in this region, comprising Railroad Commission Districts 1 and 4, produce from Eocene sands ranging in depth from 1,250 ft. to 3,850 ft.

As of January 1 of this year, there were 116 projects either active or approved by the commission in this area. District 4 was way out in front with 103—65 of them gas-injection projects, 27 water floods, and 11 combination operations. District 1 had only 13, including 5 gas, 6 water, and 2 water and gas.

In District 4, nearly half of the projects, 46 in all, were given the go-ahead in the 2 years ending January 1, and 9 of these were in Loma Novia field in Duval County. In District 1, 7 of the 13 total projects were approved during the same period.

Some of the fields in this area in which secondary-recovery operations have been undertaken are: Loma Novia, Agua Dulce, Alta Mesa, Benavides, Ben Bolt, Boyle, Colorado, Conoco Driscoll, Edlasater, Garcia, North Government Wells, Hoffman, Longhorn East, Piedre Lumbre, Plymouth, Richard King, Rincon, San Pablo, Squire, Stratton, Turkey Creek, East White point, Ezzell, Hilbig, and Lytton Springs.

Texas Panhandle

Secondary recovery in the Panhandle area, Railroad Commission District 10, is a relatively new thing. It received very little attention until about 8 to 10 years ago. This primarily was because production in the area is chiefly from limestone and dolomite reservoirs—not regarded as likely secondary-recovery prospects until recently.

The Railroad Commission currently lists 23 projects in the Panhandle as active or approved. Two of these are water floods, all the rest gas-injection operations. Five of the projects were approved in the 2 years to January 1, 1954.

One of the earliest and most outstanding operations in the region is the project conducted by the West Pampa Repressuring Association in the Brown dolomite at 3,100 ft. in the West Pampa area of Panhandle field.

This was the first project of any consequence in which gas was injected into a dolomite reservoir to increase oil recovery.

The West Pampa area is a local area on the north flank of the long extensive anticlinal structure which makes up Panhandle field. There are about 11,800 productive acres in the area and about 1,000 wells. Reservoir energy derives from expansion of solution gas.

Reliable estimates place additional oil recovered by virtue of the project at near 10,000,000 bbl. so far. On top of this, the increase in production of gas and the liquids recovered from it has more than paid for the cost of operation.

Success of the project led to formation of similar operations in the Panhandle dolomite reservoir.

Birth of Secondary Recovery in Texas

Gas injection . . . The first gas-injection project of record in the state was launched in Petrolia field, Clay County, in North Texas by Western Oil Corp. and Alberta Crenshaw in February 1926.*

The operation involved 300 wells. Gas was purchased from Lone Star Gas Co. and injected into three shallow sands. Oil production was boosted from 100 bbl. daily to 450 bbl. daily.

Success of this project inspired several other operator sto institute similar operations in North Texas with varying success.

It was not, however, until 1933 that the practice of injecting gas to increase recovery became widespread in the area.

The practice developed in West Central Texas also around 1933. Several projects were initiated in Southwest Texas in the earl ythirties.

Water flooding . . . The first attempt of record at water flooding in the state was made by The Texas Co. late in 1935—also in North Texas. The project involved flooding the 1,000-ft. sand underlying the company's 320-acre Fannie Lowe lease in Fry pool, Brown County. The project apparently was not successful and was abandoned after a brief trial.

The effort, however, did inspire several other operators who attended the Railroad Commission hearing on the project to apply for flood permits.

The second attempt and first successful flood was launched by McCarty Oil Co. on April 4, 1936, on its 144-acre Hardin lease in the Burkburnett area of Wichita County, North Texas.

When the project was started, production was averaging 10 bbl. daily from four sands. Water was injected into two of these sands at 360 ft. and 560 ft. Productive area of the 360-ft. sand was 20 acres, that of the 560-ft. sand 40 acres.

Production from the lease jumped from 10 bbl. at the start to 23 bbl. daily by the end of 1936, averaged 52 bbl. daily in 1937, and 60 bbl. daily in 1938. It declined to an average of 42 bbl. daily in 1939 and to 28 bbl. daily in 1940. By early 1941 the lease had yielded about 1,250 bbl. per acre. Approximately 800,000 bbl. of water had been injected to 1941 and about 75,000 bbl. of oil recovered.

Injection wells initially were on a line from northwest to southeast, with the drive directed to both sides of the field. Water was obtained from a shallow well near Gilbert Creek which crossed the lease. Water produced with the oil was pumped to an earthen pit, then to a three-tank treating plant where it was mixed with fresh water from the water well, treated, and recycled.

The third project of record was started April 17, 1937, by Cable Oil Co. in the 600-ft. sand underlying its 60-acre Snider lease in Young County, North Texas. Jo Cable, head of the firm, was one of the most energetic water flooders in the early days, and currently is still active in secondary-recovery operations in North Texas.

Another early and active waterflooding independent firm was J. A. White & W. C. Duncan, which started floods in the early forties in Archer and Young counties.

Future of Secondary Recovery in Texas

It would be impossible to make any kind of reasonable estimate of how much additional oil has been recovered to date in Texas due to secondary-recovery and pressure-maintenance operations.

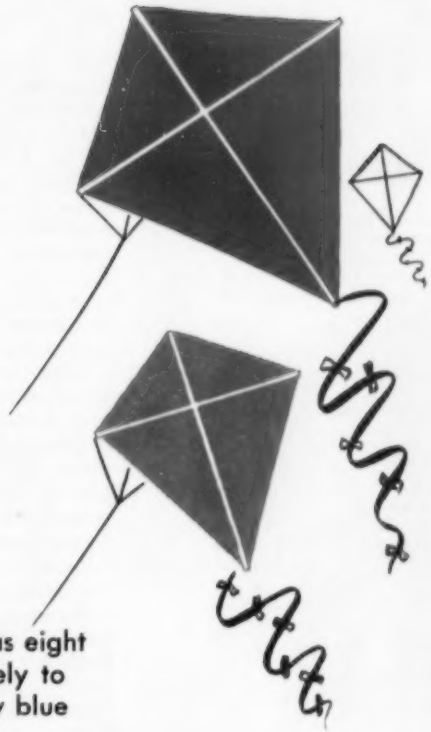
It is certain, however, that the figure is staggering and that it eventually will be many billions of barrels. Secondary oil recovered to date probably will be doubled several times over within the next 10 years, due to the growing number and size of projects and to innovations in techniques. Some of the latter, such as water imbibition and gas injection under extremely high pressures have increased recovery substantially in pilot operations in areas where conventional techniques could not be applied satisfactorily. These or other new methods will continually be developed and applied by the industry.

Acknowledgment

Much credit for data supplied for this article is due the engineering branch of the Texas Railroad Commission, Austin; Rollie Dobyns, Bureau of Mines, Wichita Falls, Tex.; Jo Cable, Cable Oil Co., Wichita Falls, and George Fancher, Texas Petroleum Research Committee, Austin.

*The first actual try at secondary recovery in the state was the Dunn & Lewis operation south of Iowa Park in Wichita County, North Texas, involving air injection into the pay sand of the company's Zink lease.

FUN IS CONTAGIOUS



We like the supply business. We like Texas. We have 29 stores in this one state, plus our Texas offices and resident salesmen.

We want you to like the idea that we like the supply business . . . and Texas. Fun is contagious and makes for efficiency. If you don't have fun you don't have anything.

When you do business in Texas eight million pair of eyes are likely to be trained your way, mostly blue and friendly.

So it becomes natural to be good neighbors, to want to help any man whose ox is in the collar or the ditch.

Oil creates a friendly fraternity. It's true in Texas . . . it's true anywhere in the fields of the United States and Canada.

We like the supply business.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION —— TULSA
Serving The United States and Canada

P·E·S·A
PARTNERS IN PETROLEUM PROGRESS

Crude Charge Capacity

(Continued from page 161)

plant in Hardeman County, North Texas.

Phillips . . . A considerable increase in chemical fertilizer capacity has been made by Phillips Chemical Co., subsidiary of Phillips Petroleum Co. At its Houston plant, a new 450-ton per day ammonia plant has been put on stream and another plant designed to make 405 tons per day of triple phosphate was also put into operation. Two additional nitric acid units have been installed adjacent to the Cactus ammonia plant in the Texas Panhandle to increase ammonium nitrate and nitrogen solutions production to 457 tons compared to 337 tons previously.

Phillips also put on stream in West Texas a plant designed to produce 5,000,000 lb. annually of high-purity paraxylene. This plant employs one of the company's newest processes, continuous fractional crystallization, which promises to have numerous applications in several industries.

Shell Chemical Corp., Houston, tripled its Epon resin facilities and as part of the same expansion opened a bis-phenol-A plant to provide feed stock. Dow, at Freeport, announced a synthetic glycerin plant to be completed in early January 1956. Both Shell and Dow opened new research labs at their respective plants during the year. An interesting outgrowth of Dow's petrochemical production was the construction of a chemical tanker, for carrying products from its Texas division plants to East Coast Caribbean and South American ports. The S.S. Marine Dow-Chem is especially fitted out with facilities to handle 11 separate cargoes without danger of contamination.

Other activity throughout the industry was to some extent based on projects started some time ago and not yet completed. Carbide, in addition to its polyethylene facilities, will produce ethylene oxide at its Seadrift plant, which is due for completion before long at a total cost of $43,000,000. Allied Chemical & Dye Corp.'s Solvay process division has an ethylene oxide and ethylene glycol plant which has just been completed at Orange, with facilities estimated to cost $5,000,000.

TABLE 3—PETROCHEMICAL PLANTS IN TEXAS

Company and location—
Allied Chemical & Dye Corp., Orange
Atlantic Refining Co., Atreco
Carbide & Carbon Chemicals Co. (Div. of Union Carbide & Carbon Corp.):
  Texas City
  Seadrift
Celanese Corp. of America:
  Bishop
  Pampa
Chillicothe Chemical Manufacturing Co., Hardeman County, North Texas (announced)
Cosden Petroleum Co., Big Spring
Crown Central Petroleum Corp., Pasadena
Diamond Alkali Co.:
  Pasadena
  Kolker Chemical Works, Pasadena
Dow Chemical Co. (See also Ethyl-Dow Chemical Co.), Freeport
E. I. du Pont de Nemours & Co., Inc.:
  Orange
  La Porte
  Victoria
Eastern States Chemical Corp., Houston
Ethyl-Dow Chemical Co., Inc., Freeport
Ethyl Corp., Pasadena
Great Southern Chemical Corp. (Pontiac Refining Co., The Chicago Corp., and La Gloria Corp.), Corpus Christi
Gulf Oil Corp., Port Arthur
Humble Oil & Refining Co., Baytown
Jefferson Chemical Co., Inc., Port Neches
Koppers Co., Inc. (Chemical Div.), Port Arthur
Lubrizol Corp., Pasadena
Magnolia Petroleum Co., Beaumont
Merichem Co., Greens Bayou
Monsanto Chemical Co., Texas City
Natural Gas Odorizing Co., Houston
Neches Butane Products Co., Port Neches
Pan American Refining Corp., Texas City
Petrocarbon Chemicals, Inc. (Subs. Stendel Oil Corp.), Irving
Phillips Chemical Co. (Subs. Phillips Petroleum Co.), Pasadena
Phillips Petroleum Co., Phillips
Pure Oil Co., Smiths Bluff
Refinery Processors, Ltd., and Oil Chemical Products, Inc., Galena Park
Republic Oil Refining Co., Texas City
Rohm & Haas Co., Pasadena
Shell Chemical Co., Houston (Deer Park)
Shell Oil Co., Houston
Sinclair Refining Co.:
  Corpus Christi
  Houston
Spencer Chemical Co., Orange (under construction)
Stanolind Oil & Gas Co., Brownsville (shut down)
Carthage Hydrocol, Inc., Brownsville (shut down)
Suntide Refining Co., Corpus Christi
Texas Co., The, Port Arthur
Texas Eastman Co. (Div. of Eastman Kodak Co.), Longview
United Chemical Co., Shelby County (announced)
Visco Products Co., Sugarland
Warren Petroleum Corp., Conroe

Texas in Top Spot in Petrochemicals Manufacture

(Continued from page 172)

pumpage to supply water for irrigation or industry.

Although the use of ground water requires investment in wells, pumping equipment, and pumping expense, together with continuous technical study and observation, it is by far the most dependable means of water supply for the petrochemical plant. However, the ground-water resources of Texas suggest that industry must turn to surface-water supply for future installations of heavy industry.

The surface water of Texas flows in general to the southeast in 10 rivers approximately parallel to each other and empties into the Gulf of Mexico. The Canadian, Red, and Sulphur rivers flow to the east but do not empty into the gulf.

Surplus water . . . The average annual runoff of the Texas rivers is also shown on the map. It should be noted that East Texas has an adequate supply of surface water while West Texas is lacking. This condition applies to rainfall as well. On the map may be noted the number of acre-feet of surplus water carried off by each river, yearly (An acre-foot of water equals 325,850 gal.). Of this average surplus of more than 50 million acre-feet, which varies from year to year, only about half, or about 25 million acre-feet, can be claimed outright by Texas.

The other half of the surplus is found in the rivers of the Red, Sabine, and the Canadian which are interstate and in the Rio Grande which is interstate and international, and must be shared with Texas' neighbors. In these rivers, therefore, is found the supply of surface water that eventually must be sought by industry, and locations must be found where these surpluses exist, primarily along the Texas Gulf Coast. The Texas Gulf Coast area in turn may be divided into areas to the east of Corpus Christi with surface water surplus and to the west with a deficiency. The above picture of surplus runoff does not imply that such water is available for plant operations, but only after suitable means have been provided to capture and retain it during flood stage periods so that it can be available during times of low stream flow.

Location of Plant Sites

The present location and production (does not include butadiene for synthetic rubber) of the organic petrochemical plants are noted on the map. Included is notation of carbon-black production in the Panhandle of Texas which accounts for 50 per cent of the total United States production. Although spotted production of petrochemicals exists throughout Texas, presently about 85 per cent of the nation's organic petrochemical plants are located on the Gulf Coast within 200 miles of Houston.

The Texas Gulf Coast may be divided into five sections. These, together with an estimated breakdown in their production of organic petrochemicals, are: Sabine section, 1.5 billion pounds; Houston section, 2.5 billion pounds; Victoria section, 0.7 billion pounds; and the Corpus Christi-Brownsville sections, 1.3 billion pounds. This estimated total

yearly production of about 6 billion pounds of organic petrochemicals is about 80 per cent of the total United States production. It is estimated that this production will approach upwards of 25 billion pounds yearly by 1975 at locations along the Texas Gulf Coast as noted on the map.

Acknowledgement

Acknowledgement is hereby made to John R. Stockton, director, Bureau of Business Research, College of Business Administration, University of Texas, Austin, for permission to use a portion of the many excellent publications on this and related subjects which have been prepared at the university by him and his staff.

References

1. More Water for Texas, by Walter Prescott Webb, University of Texas Press, 1954.
2. Economics of Natural Gas in Texas, by John R. Stockton, Richard C. Henshaw, Jr., and Richard W. Graves, University of Texas Press, 1952.
3. Publications of the Texas Board of Water Engineers:

Barnes, J. R., et al. Geology and Ground Water in the Irrigated Region of the Southern High Plains in Texas. Progress Report No. 7. (1953).

Board of Water Engineers. Nineteenth Report, September 1, 1948—August 31, 1950 (1950).

Board of Water Engineers. Twentieth Report, September 1, 1950—August 31, 1952 (1952).

Goines, W. H., A. G. Winslow, and J. R. Barnes. Water Supply of the Houston Gulf Coast Region. Bulletin No. 5101 (1951).

Hood, James W., and Doyle B. Knowles. Summary of Ground-Water Development in the Pecos Area, Reeves and Ward Counties, Texas, 1947-1951 (1951).

Lang, J. W., A. G. Winslow, and W. N. White. Geology and Ground-Water Resources of the Houston District Texas (1950).

Leggat, E. R. Development of Wells for Irrigation and Fluctuation of Water Levels in the High Plains of Texas to January 1951.

Scalapino, R. A., and Burge Irelan. Ground-Water Resources of the El Paso Area, Texas.

Sundstrom, Raymond W., and James W. Hood. Results of Artificial Recharge of the Ground-water Reservoir at El Paso, Texas (1952).

4. Publications of the United States Bureau of Reclamation:

Program Report for the West Texas Project (1952).

Water Requirements Survey, Texas Coastal Plain (1951).

Water Requirements Survey, Texas High Plains (1952).

Water Supply and the Texas Economy: An Appraisal of the Texas Water Problem 1952). Reprinted in Washington as Sen. Doc. 57, 83d Cong., 1st Sess. (1953).

New Texas Plant

(Continued from page 185)

densate is removed and then to the plant compressors. The gas is compressed from 20 to 500 psig. in two stages by three engines, turbo-flowed and supercharged to 1,100 hp. per unit, with water-cooled interstage and discharge cooling.

The gas then flows through an absorber, residue scrubber, and to a gas pipeline. The absorber utilizes two water-cooled intercoolers to remove the heat of absorption and thus keep the lean-oil circulation requirements to a minimum. The rich oil from the absorber flows to a rich-oil deethanizer-reabsorber operating at 175 to 200 psig. where all of the methane and essentially all of the ethane are removed.

The residue gas from the reabsorber provides fuel for the plant boilers and heaters. Fuel gas for the compressor engines is taken from either the main absorber residue stream or the reabsorber residue. The rich oil leaving the deethanizer - reabsorbers is pumped through rich oil-lean oil heat exchangers, a hot rich-oil vent tank, a rich-oil heater and into the still. In the still, which operates at 130 psig., a substantially ethane-free raw product is removed from the oil by steam stripping.

This raw product is pumped through exchangers to the depropanizer where sufficient propane may be removed from the bottom product to make commercial butane overhead from the debutanizer. The depropanizer may also be operated such that enough propane is left in the bottom product to produce a propane-butane mixture of desired vapor-pressure overhead from the debutanizer. The butane and gasoline products from the debutanizer flow directly to storage while the propane product passes through solid-desiccant-type dehydrators before going to the storage tanks.

The plant was designed to recover 75 per cent of the inlet propane while processing 15,000,000 cu. ft. per day. The plant is also capable of processing 25,000,000 cu. ft. per day at a lower propane recovery while circulating the same quantity of lean oil as required for 15,000,000 cu. ft. per day design. Product storage consists of nine 42,000-gal. tanks, five for propane, two for butane or L.P.G., and two for gasoline.

Steam power . . . Steam is used for power throughout the plant. Use of steam power was decided upon for two reasons: (1) Economy in initial investment, and (2) speed of construction.

Turbines work off 250-lb. steam on oil-field-type boilers. The exhaust from the turbines is condensed at atmospheric pressure at a large radiator-type condenser. Total steam generated in plant is 30,000 lb. per hour.

The boilers are insulated and set on foundations in the open.

In view of the completely closed steam system, the plant achieves a very high percentage of condensate return.

Protective Clothing by *Sawyer*

Wears like iron — takes endless rubbing, scraping, snagging, and still gives full protection.

100% Waterproof — made with top quality base fabric saturation-coated first and then coated with 6 coats of Neoprene Latex.

Positively will not blister, crack or peel. Its longer lasting quality means greater economy.

Also: Three-quarter and long coats, aprons, coveralls and many other styles. All clothing made in black or yellow.

FROG BRAND

THE H.M. SAWYER & SON CO.

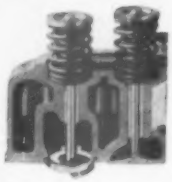
Cambridge, Massachusetts

Here's Why!

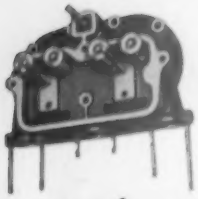
ALLIS-CHALMERS ENGINES COST LESS TO OPERATE

All Allis-Chalmers Engines have Removable Cylinder Sleeves

Valve-in-Head construction



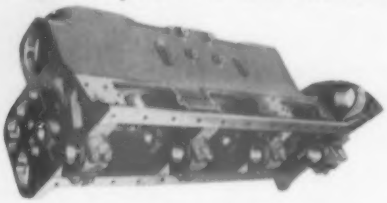
and on the larger size engines one Interchangeable



Head to each two cylinders. Permits one

man to make repairs at the location.

Heavy



Blocks keep parts in proper alignment; Pressure Lubrication to all internal moving parts. Mass Production keeps first cost and repair parts prices low. Sold and serviced by the organization, who care enough to service every engine when it is put on the job. Repair parts service available in all oil producing areas through the vast facilities of the Allis-Chalmers branches and dealers and Fred E. Cooper, Inc. branches.

FIVE Popular SIZES

E — 563, 563 cu. in.
U — 318, 318 cu. in.
W — 226, 226 cu. in.
W — 201, 201 cu. in.
B — 125, 125 cu. in.

FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA
Houston, Odessa, Los Angeles

RELIEF VALVES FOR COMPRESSED-GAS CONTAINERS—3

Calculating Ratio for Specific Heats

by F. J. Heller

THE compressibility factor, Z, for most gases can be defined in terms of a reduced equation of state. Charts have been published which comprise a series of lines representing compressibility factor, Z, plotted against reduced pressure $P_R = P/P_c$, for different values of reduced temperature, $T_R = T/T_c$. The letters P_c and T_c denote the critical pressure and temperature, respectively, of the gas in question; whereas, P and T are its actual pressure and temperature. Curves of Z versus P_R for T_R's are presented in "Chemical Process Principles Charts" by Hougen and Watson, Sixth Printing, January 1951. Critical pressure and temperature data are available in most of the chemical handbooks such as, for example, Perry's "Chemical Engineers Handbook," third edition.

If this leaves one still in doubt about what the compressibility factor should be for any particular gas for which no data are available, it is suggested that a value of 1.00 be assigned and used in determining the relieving capacity of the safety device. The use of 1.00 for the compressibility factor would be on the safe side but still not overly restrictive.

Calculation of Ratio of Specific Heats

In the event the ratio of the specific heats at relieving conditions is unknown, and cannot be determined from the literature, the conservative procedure is to use the ratio at atmospheric conditions.

However, a method is suggested by which it is usually possible to closely estimate the ratio of the specific heats at working conditions. It is based on a generalized correlation developed by Edmister similar to the correlation by which compressibility factors are determined.

The method of obtaining the compressibility factor, Z, has been explained. This factor is the ratio of ideal to actual volumes. If, instead of the ratio, we should consider the difference between the ideal and actual volumes, an equation of state for any gas could be written thus:

$$V = RT/P - \alpha$$

in which:

- V = actual volume, cu. ft. per lb. mole
- T = temperature, °F. absolute
- P = pressure, lb. per sq. ft. absolute
- α = residual volume, cu. ft. per lb. mole
- R = gas constant = 1,544, ft.-lb. per lb. mole per °F.

The critical residual volume of any gas is:

$$\alpha_c = \alpha/\alpha_r$$

From basic thermodynamics:

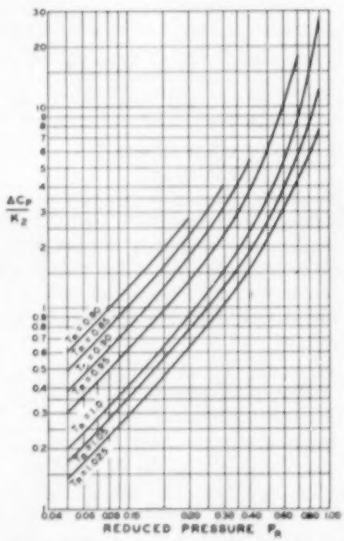


Fig. 3—Plot of $\Delta C_p/K_1$ against reduced pressure at various reduced temperatures. Source: Edmister, Ind. Eng. Chem. 30, 352 (1938).

$$\frac{(\partial C_p)}{(\partial P)_t} = -T\frac{(\partial^2 V)}{(\partial T^2)_P}$$

in which $(\partial C_p)/(\partial P)_t$ is the partial derivative of the isobaric (constant pressure) specific heat with respect to pressure at constant temperature. Substituting reduced units and residual volume:

$$\frac{(\partial C_p)}{(\partial P_r)_{Tr}} = \frac{P_c\alpha_c}{T_c}T_r\frac{(\partial^2\alpha_r)}{(\partial T_r^2)P_r}$$

Then, integrating between limits and defining the ratio $P_c\alpha_c/T_c$ as a constant K_1:

$$\Delta C_p/K_1 = T_r\int_0^{P_r}\frac{(\partial^2\alpha_r)}{(\partial T_r^2)_{Pr}}\,dP_r$$

ΔC_p is the increase in specific heat from zero pressure to any reduced pressure P_r. Edmister (Ind. Eng. Chem. 30, 352, 1938) has integrated

$$\int_0^{P_r}\frac{(\partial^2\alpha_r)}{(\partial T_r^2)_{Pr}}\,dP_r$$

graphically and has obtained values for $\Delta C_p/K_1$ for various reduced pressures and temperatures. For convenience, some of these values are reproduced graphically here (Fig. 3). The ratio $P_c\alpha_c/T_c$ is very nearly constant for all gases, with a value of 1.45 B.t.u. per lb. mole approximately.

Thus, to determine the specific heat at constant pressure at relieving conditions [$(C_p)_p$ = p], first determine P_r and T_r for the gas.

Using the values for P_r and T_r, obtain the value of $\Delta C_p/K_1$ from Fig. 3. Multiply this value by 1.45. This yields ΔC_p for the gas in B.t.u. per lb. mole per °F. Obviously, it is necessary that ΔC_p be added to the isobaric specific heat at zero pressure in order to obtain a value

Author is technical representative, Phillips Petroleum Co., Bartlesville, Okla.

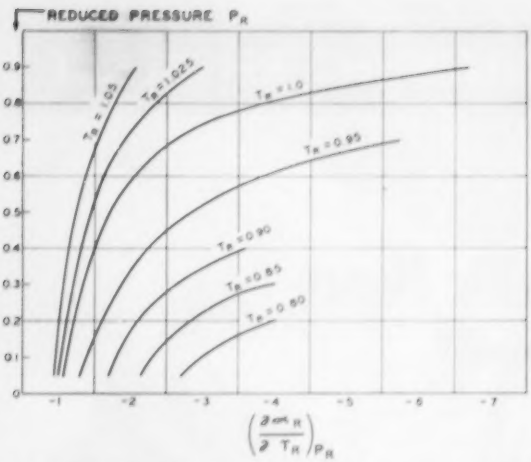


Fig. 4—Plot of $(\partial a_R/\partial T_R)_{T_R}$ against reduced pressures for various reduced temperatures.

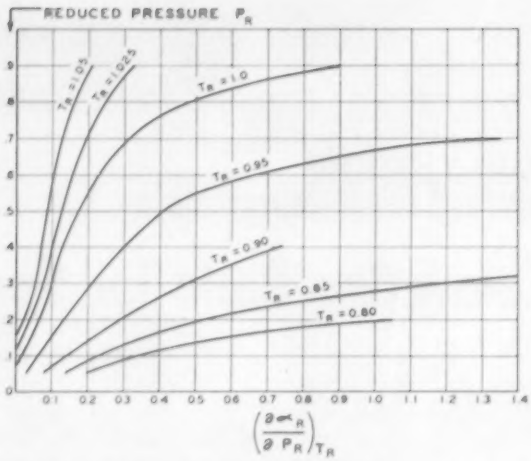


Fig. 5—Plot of $(\partial a_R/\partial P_R)_{T_R}$ against reduced pressure for various reduced temperatures.

for the isobaric specific heat at working conditions. The zero pressure isobaric specific heat at working temperature is readily found for most gases. For example, Sweigert and Beardsley, of Georgia School of Technology, have published empirical heat equations based on spectroscopic data for many gases.

The next step is to determine $C_p - C_v$. Again from basic thermodynamics:

$$C_p - C_v = -\frac{T\,(\partial V/\partial T)_p^2}{(\partial V/\partial P)_t}$$

Substitution of reduced units and residual volume and taking $P_c a_c/T_c$ equal to 1.45 B.t.u. per lb. mole yields:

$$C_p - C_v = T_r \frac{[1.987/P_r - 1.45\,(\partial a_r)/(\partial T_r)_{P_r}]^2}{1.987/P_r^2 + 1.45\,(\partial a_r)/(\partial_{P_r})_{t_r}} \text{ B.t.u. per lb. mole per °F.}$$

Edmister has determined values for $(\partial a_r)/(\partial T_r)_{P_r}$ and $(\partial a_r)/(\partial P_r)_{t_r}$ and these values are here reproduced graphically for various reduced pressures and temperatures (Figs. 4 and 5).

We have now determined C_p and $C_p - C_v$. Obviously, $C_v = C_p - (C_p - C_v)$. From these values it is possible to determine k from the relationship $k = C_p/C_v$. Now, knowing k, C can be determined from Fig. 1, given in the preceding installment.

Factors in Selection

In the sizing of a safety-relief device one must make allowance for any or all of the previous conditions of exposure or use of the container and, in addition, choose the type of safety device to be used. Not counting combination devices there are four choices; namely, use of no safety-relief device, a frangible disk device, a fusible metal device, or a spring or weight loaded safety-relief valve. Very briefly, the safety-relief device choice is made after considering the following factors:

1. Characteristics of the gas:
   (a) Rate of pressure rise due to temperature increase
   (b) Possibility of chemical or physical change due to properties of the gas or possible impurities.
   (c) Toxicity.
   (d) Panic potential if released.
   (e) Flammability.
   (f) Chemical reaction gas would have with surrounding materials.
   (g) Corrosiveness of gas to various types of safety devices.
2. Size of container.
3. Space available on container for safety-relief device.
4. Whether or not it is desirable to prevent escape of entire contents of container after cause for safety-relief device functioning has been alleviated.

Generally speaking, only the poisonous gas containers do not have safety-relief devices.

Frangible disks afford protection against external sources of heat, improper charging, or internal reactions when the increase in internal pressure is sufficient to rupture the frangible disk before the container walls are overstressed. A disadvantage of this type protection device is that corrosion adversely affects the bursting pressure and quite often premature failure is encountered. Once the frangible disk bursts, the entire contents of the container are released. This device also provides poor protection against heat when a partially filled container exposed to fire will not build up sufficient pressure to rupture the disk before the heat will seriously weaken the container.

Fuse plugs are thermal operating devices and they provide good protection against fire conditions for they function before the temperature weakens the container walls. Here again, once the device functions the entire contents of the container are released. However, since this is a thermal operating device, it affords no protection against overcharging or an internal reaction that doesn't generate sufficient heat to operate the device before the pressure becomes excessively high.

A safety-relief valve is a pressure-operating device that affords good protection, if properly sized and well designed, against excessive pressure and at the same time does not release the entire contents of the container if the pressure decreases. Its limitation is that the pressure when the valve reseats remains high in the container after the liquid (where applicable) has vaporized.

Without going much further into the subject of the different types of safety-relief devices, mention should be made of two combinations of devices which are commonly used, i.e., a combination frangible disk and fusible-plug device, and a combination safety-relief valve and thermal device, each of which combines pressure and thermal protection.

Factors Affecting E.m.f.

by R. I. Martin

IN practice the e.m.f. involved may vary from well to well, either because the salinity of the mud, or of the formations, is different. A smaller effect may be due to a different differential pressure. In a given well, however, and for the same type of formation not too different in depth there is a definite tendency for the e.m.f. to be the same for all beds of the same type.

This is clearly shown by logs of formations consisting of thick shales and thick water sands. In front of the shales the log gives a good straight base line while the peaks corresponding to the sands generally have the same values. This implies that the e.m.f. is the same for all of them.

Thin sands may give smaller peaks, and conversely thin shales may not return to the base line. These effects of thin beds may be due to other factors which will be described later, so that there is no need to assume that the e.m.f.'s produced are smaller. On the contrary, the fact that there is a good base line shows that most shales are of very similar nature, while the fact that all large peaks are of the same amplitude shows that salinity and differential pressure are the same for thick salt-water sands. It is probable therefore that conditions should be the same for thinner beds in between. It is logical to look for other factors, in particular the thickness, to explain the smaller observed deflections.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

Permeable beds of different porosity, or with the same porosity and different grain size give the same e.m.f., if other factors are unchanged. The e.m.f. is also independent of the permeability value, provided of course, that the formation is permeable. Sufficient permeability to cause S.P. deflections is very much less than the permeability required to produce commercial quantities of oil.

The electrochemical e.m.f. depends only on the salinity of the connate water, salinity of the mud, and the nature of the surrounding shale. The electrofiltration effect depends only on the differential pressure and the nature of the mud.

It is found that salinity and differential pressure are not always constant, especially for sands at widely different depths, or in very different formations, so that variations may be expected. For example, fresh-water sands will appear with low peaks or reversed peaks, while salt-water sands of abnormally high salinity give rise to very large peaks. Depleted sands, when the pressure is very low, tend to give peaks of large amplitude, but this effect may often be masked by the contrary effect of invasion.

When special muds are used, for example silicate muds, the polarity of the e.m.f. is reversed, as is the S.P. log.

The hypothesis of a constant total e.m.f. made to assist in explaining some of these phenomena is, in fact, often conformed to in actual conditions. This is true in the case of thick sands and shales when:

1. All the shales are of similar nature.
2. The salinity of the connate water in all sands is nearly the same.
3. The differential pressure is the same for all sands.

In Fig. 1 the S.P. peak value is shown as a function of bed thickness for different values of Rt/Rm. For example, if bed thickness is 4 d, and Rt/Rm is 21, a peak value which is 60 per cent of the static S.P. may be attained.

The same information arranged in a different manner shows, for example, if Rt/Rm is less than 10, then 90 per cent of the maximum deflection is obtained when the bed thickness is 8 times the hole diameter, or greater.

In practice the resistivities of successive beds are not always the same, and may differ widely. Computations of the S.P. log are extremely difficult under these conditions, but the shape of the S.P. log is generally very similar. Except in extreme cases, the boundaries between beds still correspond to points of inflection on the log.

When the resistivities are different in the sand and surrounding shale the shape of the S.P. curve will lack symmetry when it crosses the boundary. It will be more rounded in the more resistive formation and the inflection point will be displaced towards the base of the peak if the peak corresponds to the more resistive formation.

An increase in hole diameter has an effect similar to an increase in the resistivity ratio. It tends to round the peaks on the S.P. log, and to reduce the amplitude of peaks opposite thin beds.

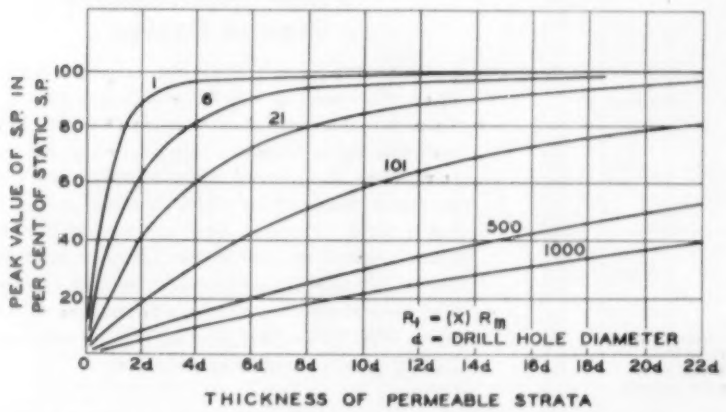


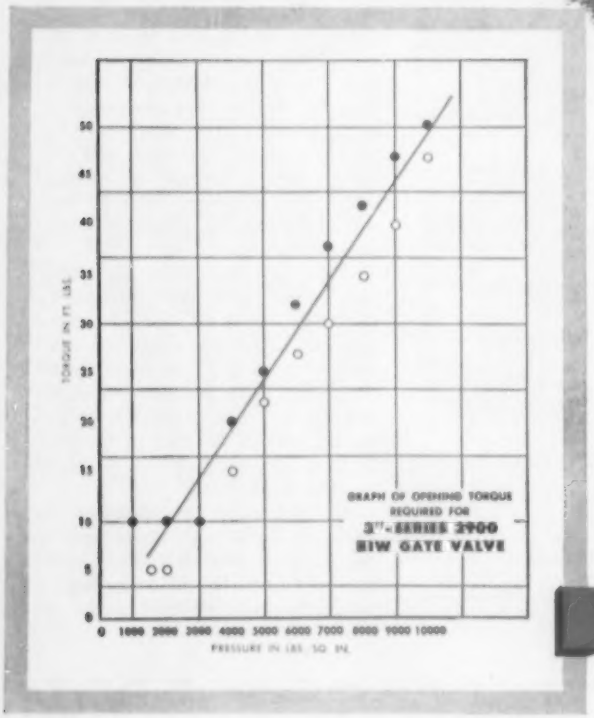
Fig. 1—Spontaneous-potential peak value as a function of thickness for different values of Rt/Rm. From Doll, H. G., "The S.P. Log: Theoretical Analysis and Principles of Interpretation," A.I.M.E., T.P. 2463, September 1948.

START STOPPING VALVE EXPENSE NOW

BIW
NON-LUBRICATED GATE VALVE

10,000 POUND WORKING PRESSURE

15,000 POUND TEST PRESSURE


TORQUE IN FT. LBS.
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
PRESSURE IN LBS. SQ. IN.
GRAPH OF OPENING TORQUE REQUIRED FOR 3" - SERIES 2900 BIW GATE VALVE

- **Easy to Open**
- **Low Maintenance**
- **Proved Design**

Look at the graph showing torque necessary to open this new 10,000 lb. working pressure valve. Consider the fact that you don't need lubricant, that this valve is ready to go when you are. And remember, the proved metal to metal seal — proved in more than 35,000 BIW Valves in the field — holds tight. Once in you can forget it. No man hours wasted on lubrication. Simplified design for years of operation without trouble. Have your BIW man show you all the advantages of the complete BIW Valve line and of this newest member, 10,000 pounds working pressure.

BIW

BEAUMONT IRON WORKS CO.
Beaumont, Texas

Subsidiary of American Locomotive Co.
General Sales Office: 1404 Dunlavy St., Houston 19, Texas
Warehouses in Beaumont and Odessa

Mud Pressures in Tripping With Drill Pipe

by George S. Ormsby

PRESSURE changes of considerable magnitude can occur at the bottom of a hole due to pipe running or pulling.

In Fig. 1, it is assumed that for a "good mud," the mud surface inside the drill pipe would remain level with the annular mud surface as the pipe was moved vertically at any speed from ½ to 6 ft. per second. The pressure losses in each part of the string are calculated on that basis; and the additive curves for the annular drop are plotted. Only the total drop for the inside of the drill pipe is plotted, with and without bits.

The difference between the total-annular-drop curve and the total-inside-drop-less-bit curve indicates that an impossible condition was set up. The inside and annular drops must equal each other, else a pressure differential will be created below the bit (or open end of the pipe) which will result in a flow from the annulus into the pipe, or vice versa, as the total heads attempt to equalize.

Author is with Phillips Petroleum Co., Houston. These illustrations are from a paper presented at A.P.I. Division of Production, southwestern district meeting, Houston, March 3-5, 1954.

The reader has probably stood on a derrick floor and watched as stands pulled "wet" starting off bottom, but would "dry" by the time the joint was broken. Going in the hole, the mud surface inside the pipe would go down with each joint and rise again as the connection was made. This is a common phenomenon and the string of this case would behave in that exact manner for the reasons pictured in Fig. 1.

Since the mud surface inside the pipe will move downward, relative to the ground, as each stand is lowered in the hole and will rise again while the connection is made, the volume flow in the annulus is always more than the steel volume entering the hole. This condition creates annular pressure drops approaching plugged bit conditions.

The true change in bottom-hole pressure will always lie between the values of total inside drop and total annular drop when both are calculated on the false assumption of 100 per cent fill. The safest and easiest method of predicting bottom-hole surges with drill pipe is to assume the bit to be plugged, especially since it happens occasionally.

Plugged-bit calculations on good and poor muds are graphed in Fig. 2 with conventional water courses. A formation bottom-hole pressure 600 psi. less than the static head of 15,000 ft. of 17.5 lb. per gal. mud is assumed. Muds that would result in twice the loss of the poor mud in Fig. 2 at pipe velocities between 0 to 3 ft. per second frequently occur in the field.

With this in mind, it is easy to visualize "trip gas" entering the hole as the total instantaneous b.h.p. line crosses the formation b.h.p. line while the pipe is pulled through high viscosity mud. The advisability of starting the pipe pull as soon as possible after stopping circulation is indicated, for the effect of time gels cannot be included in these calculations.

Balling of the bit or drill collars has been mentioned as a source of great pressure loss. There is no doubt that clinging of mud to the steel has occurred and has stuck strings of pipe; however, when one considers the tremendous velocities necessary to create large pressure drops in short sections, the question occurs, "How can a nozzle of mud withstand the necessary velocities?" On the other hand, if long lengths of balling existed, would not the pipe be stuck? Drag on the pipe is not necessarily an indication of balling, or even of wall sticking, for the pulling and running pressure differences in Fig. 2 will act as a force on a string of pipe as they would on any other piston arrangement. Most pressure losses are due to straightforward calculable factors and appreciable losses from balling occur rarely, usually accompanying stuck pipe.

The next installment will discuss pressures associated with running casing.

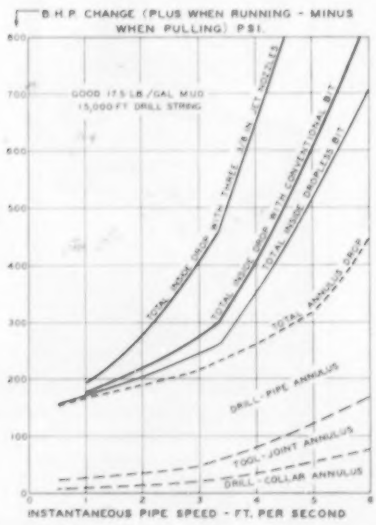

B.H.P. CHANGE (PLUS WHEN RUNNING - MINUS WHEN PULLING) P.S.I.
GOOD 17.5 LB./GAL MUD
15,000 FT. DRILL STRING
TOTAL INSIDE DROP WITH 3/8 IN. JET NOZZLES
TOTAL INSIDE DROP WITH CONVENTIONAL BIT
TOTAL INSIDE DROP-LESS BIT
TOTAL ANNULUS DROP
DRILL PIPE ANNULUS
TOOL-JOINT ANNULUS
DRILL COLLAR ANNULUS
INSTANTANEOUS PIPE SPEED - FT. PER SECOND

Fig. 1—Pressure changes from running (or pulling) drill pipe showing impossibility of mud level inside remaining level with flowline.

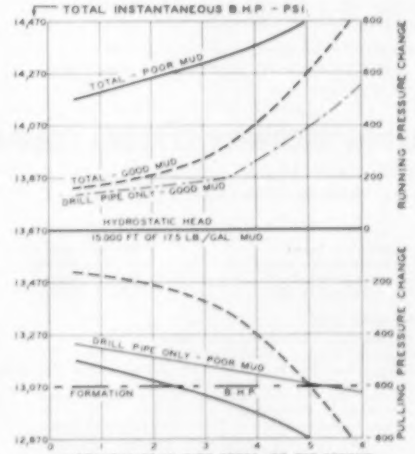
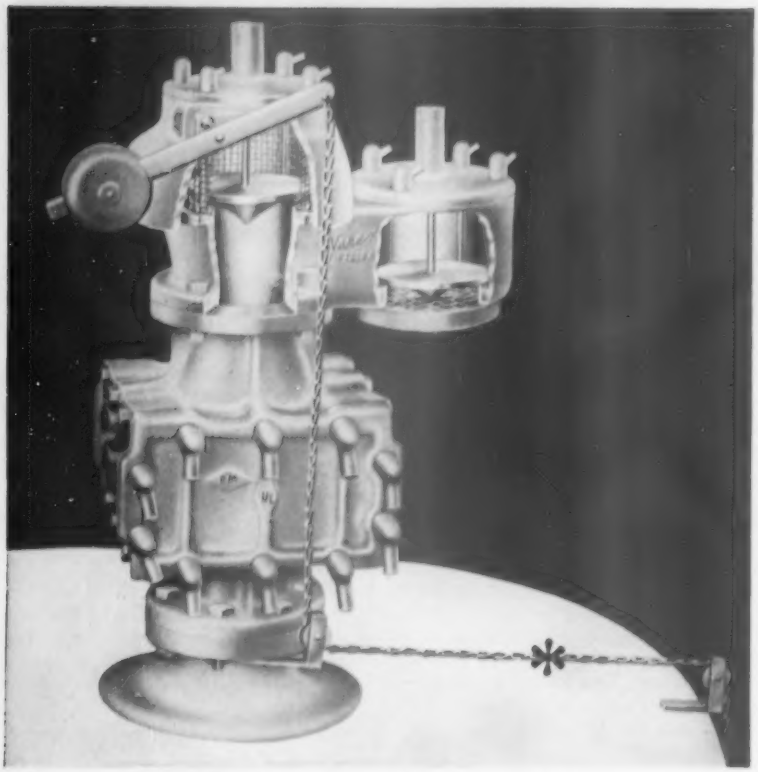

TOTAL INSTANTANEOUS B.H.P. - P.S.I.
TOTAL - POOR MUD
TOTAL - GOOD MUD
DRILL PIPE ONLY - GOOD MUD
HYDROSTATIC HEAD
15,000 FT. OF 17.5 LB./GAL. MUD
DRILL PIPE ONLY - POOR MUD
FORMATION B.H.P.
RUNNING PRESSURE CHANGE
PULLING PRESSURE CHANGE
INSTANTANEOUS PIPE SPEED - FT. PER SECOND

Fig. 2—Calculated bottom-hole-pressure changes from running and pulling drill pipe.



EFFICIENT VENTING CUTS VAPOR LOSS

Considerable profits are dissipated to the atmosphere when vent pallets warp, stick open or prevent excessive "blowdown." "VAREC" Fig. No. 5800 Conservation Vent Units are ideal equipment for venting volatile or inflammable liquid storage. They protect against dangerous over and under pressures and accidental ignition. Streamlined passages insure maximum flow. Regrindable and renewable metal pallet seats provide extra long life. Drip rings eliminate condensate collection, reducing possibility of freezing. Hyperbolic pallets, loosely guided, prevent sticking and minimize flutter. Flame Arrester unit listed by Underwriters' Laboratories and approved by Factory Mutual Laboratories. Send for free Bulletin CP-2001.

* *Remote Control Flame Snuffer Sheave Brackets, Fig. 130 are optional at extra cost. This assembly is preferable where vent unit is set back from edge of tank.*

"Varec"

THE VAPOR RECOVERY SYSTEMS COMPANY

COMPTON, CALIFORNIA

Cable Address: VAREC COMPTON CALIF. (U.S.A.) All Codes

SALES OFFICE AT:

Boston 11, Mass.	Houston, Texas	San Francisco, Calif.
Chicago 6, Ill.	Minneapolis, Minn.	St. Louis 20, Mo.
Detroit 26, Mich.	New York 7, N. Y.	Seattle, Wash.
Honolulu, Hawaii	Pittsburgh 19, Pa.	Tulsa 9, Okla.

FOREIGN SALES AGENCIES AT:

ARGENTINA, Buenos Aires	H. Hennequin & Cia. Av. Belgrano 881
BELGIUM, Brussels	Etab. Emeric Kroch, 75 Blvd. Clovis
BRAZIL, Rio de Janerio	Sociedad Importadora de Equip., Av. Calogeras No. 15-7 S/708
CANADA, Montreal	Peacock Bros. Ltd. Town of La Salle
CANADA, Toronto	J. F. Comer Co., 508 Federal Bldg., 85 Richmond St. West
HOLLAND, Amsterdam C	Comprimo N. V. Amstel 21C
JAPAN, Tokyo	American Japan Trading Co., 213 Chrom Ginza Chuo-Ku
MEXICO, Mexico City 4, D.F.	Schultz y Cia., S.A., Col. San Rafael, Sullivan 119
SWEDEN, Stockholm	Kemi-Intressen, P.O. Box 16363
SWITZERLAND, Zurich	Urania-Acessories, Newmuhlequai 24
VENEZUELA, Barcelona	Waldrip-Campbell, Apartado 30
VENEZUELA, Marcaibo	Waldrip-Campbell, Apartado de Correo 594

FOREIGN MANUFACTURING LICENSEES:

ENGLAND, London	Wm. Neil & Son, Ltd., 38 Victoria St. S.W.1.
FRANCE, Paris	Compagnie Tech. des Petroles, 134 Blvd. Haussman

58-1

Tripplehorn PARAFFIN SCRAPERS

Still the BEST ANSWER to Paraffin in Pumping Wells!

New Improvements:

1. New specially processed, cold-rolled, scale-free steel.
2. Latest heat treating with atmosphere controlled furnaces.
3. New design and forming.

These improvements have resulted in perfect Triple-Spiral Spring-tempered Scrapers.

OTHER ADVANTAGES:

- No Welding — installed at the well.
- SAVES TIME AND MONEY, CAN BE RE-USED on replacement rods.
- May be spaced for any stroke length.
- Will not slip if rod is stressed. Tested for 2350 lbs. grip.
- Now in use in EVERY PARAFFIN AREA.
- Sizes available for IMMEDIATE DELIVERY — TO FIT ⅝" to 1" rods in 2", 2½", and 3" tubing.

Conveniently packaged and easily identified!

DISTRIBUTED BY

Bethlehem, Bovaird, Continental, J & L, Mid-Continent, National, Oilwell, Republic, United, and Wilson Supply Co.

The TRIPPLEHORN CO.

Phone FE-3231

P. O. Box 6326 DALLAS, TEXAS

How to Determine Dilutent in Used Railway Diesel Oils—5

by L. L. Davis and H. E. Luntz

USING the procedure outlined in the preceding installment, a tentative general correlation has been developed as shown in Fig. 7. This correlation is based on data using the three diluents discussed previously with oils varying in flash from 330° to 550° F. and in character from 50 to 95 v.i. On Fig. 7 the "per cent dilution" curves represent the parameters of the intercepts between the constant percentage lines and the flash of the oil. The scale in the lower right-hand corner represents the locus of the focal points of the same lines for given oil flashes.

From this general correlation, flash versus per cent diluent charts may be constructed for any oil having a Pensky-Martens flash between 330° and 550°.

As an example, Fig. 8 shows the construction of such a chart for an oil having a flash of 435° F. From Fig. 7 the focal point is estimated to have the coordinates of 96° F. flash and 100 per cent reduction in flash. The intercepts of the percentage lines on the 435° F. flash line are:

Per cent	Scale	Per cent	Scale
1	7	5	29.4
2	13.2	10	43
3	19.1	20	57
4	24.0	30	67

Fig. 8 is then constructed similar to Fig. 6 (shown in preceding installment) as follows: The focal point is located and the per cent scale plotted on the 435° F. flash line. Straight lines between the scale and the focal points are the constant per cent lines. The intercepts of these lines with any line between the flash of the oil (435° F.) and the flash of the diluent will give the flash of the blend. The dotted lines represent the blend lines for the three diluents under consideration. Thus, on the diesel fuel line (192° F. flash) the

Authors are with development and research department, Continental Oil Co., Ponca City, Okla.

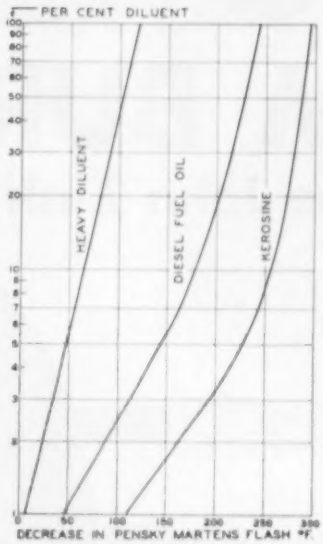


Fig. 9——Estimated decrease in flash of diesel-engine oil (original flash 435° F.).

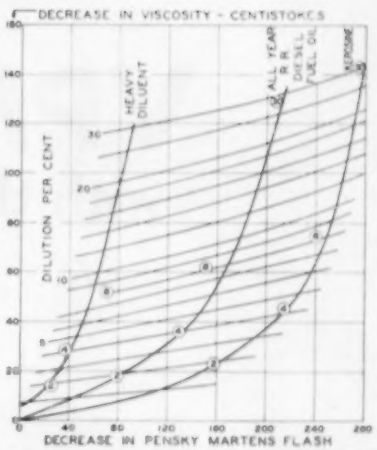


Fig. 10—Estimated dilution diesel-engine oil (original flash 435° F., viscosity 167 cs. at 100° F.).

flash and the decrease in flash of the blends are:

Per cent	Flash P.M., °F.	Decrease
1	387	48
2	350	85
3	324	111
4	305	130
5	290	145
10	256	179
20	232	203
30	219	216

These decreases in flash are plotted in Fig. 9, and smoothed curves drawn for the three diluents.

The accuracy of the flash correlation of diluent blends is indicated by the following summary:

Diluent—	No. of blends	Avg. diff. between est. and actual flash, °F.
Heavy diluent	26	2.5
Diesel fuel	28	7.1
Kerosine	28	9.0
Total	82	4.9

The relatively larger differences with the low-flash diluents are partially, if not largely, due to the inherent difficulty in accurate measuring of flash of a blend of lube oil with only a small amount of a light oil. Appreciable difference occurs between different technicians due to variations in sample preparation and handling procedures.

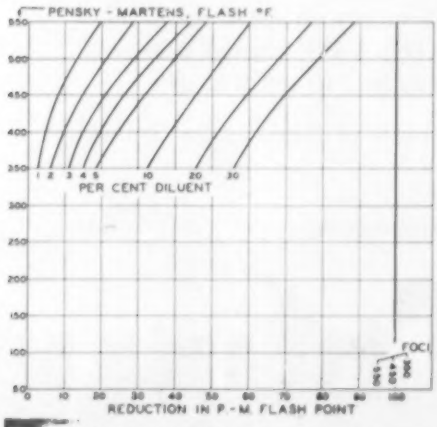


Fig. 7—Diesel-engine-oil dilution. General correlation of Pensky-Martens flash.

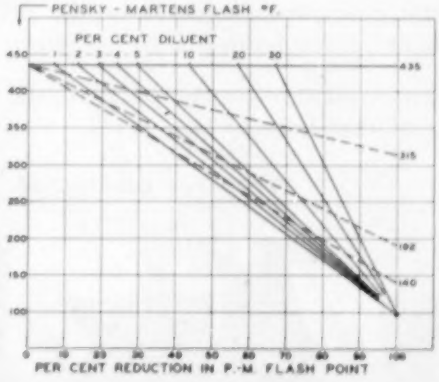


Fig. 8—Estimated flash versus dilution for diesel-engine oil (original flash at 435° F.).

Construction of Final Correlation Chart

From Figs. 5 and 9 the decreases in viscosity and flash are obtained for any desired blend, and a final correlation chart may then be constructed for the oil (in this case for one having a viscosity of 166.8 cs. at 100° F. and a Pensky-Martens flash of 435° F. as shown in Fig. 10.

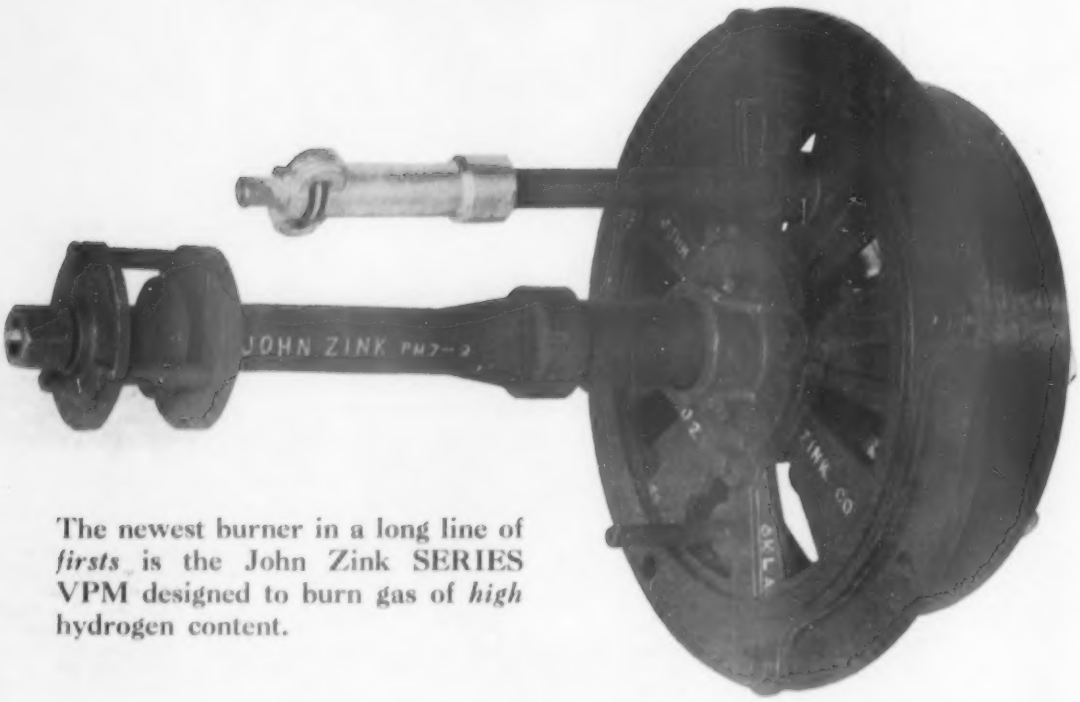
The accuracy of the chart is indicated by the small circled numbers which locate the measured decreases in viscosity and flash for a series of experimental blends.

JOHN ZINK

JZ

VPM BURNER

with the John Zink ST pilot



The newest burner in a long line of *firsts* is the John Zink SERIES VPM designed to burn gas of *high* hydrogen content.

Burns with a short and crisp flame with primary air door open. The new high efficiency aspirator on the SERIES VPM burner makes it possible to switch from a *high* hydrogen gas fuel to natural gas.

The new aspirator combined with the small orifices in the spider eliminate flash-back.

Write for additional information

JOHN ZINK COMPANY

4401 South Peoria **Tulsa, Oklahoma**

Kauri Butanol Number of Petroleum Solvents

by W. L. Nelson
Technical Editor

"What Kauri butanol number can we expect with our Mid-Continent naphthas?"—S.W.P.

Kauri butanol is a test wherein Kauri gum is caused to be precipitated from a solution of n-butyl alcohol by the addition of the solvent or naphtha. One hundred milliliters of benzene can be added without causing cloudiness and it has a Kauri butanol number of 100. Thus, Kauri numbers are somewhat a measure of the aromatic hydrocarbon content or the aromatic properties of the naphtha. One would therefore expect a somewhat low Kauri butanol number (31-41) for conventional Mid-Continent naphthas. If more is known of the characteristics of the naphthas such as gravity, boiling range, aniline point, or characterization factor, Figs. 1, 2, and 3 shown here can be employed to obtain more accurate estimates. The correlation of Kauri number with characterization factor and midboiling point (Fig. 1) is reasonably exact, whereas aniline point appears to vary widely (Figs. 2 and 3).

Somewhat the same variables have been correlated by Harvey and Mills (Analytical Chem. 20, 207, 1948) as shown in the following equations, and the accuracy appears to be very good:

For K.B. below 50:

$$K.B. = 99.6 - 0.806G - 0.177A + 0.0755\,(340\text{-}B)$$

For K.B. above 50:

$$K.B. = 117.7 - 1.06G - 0.249A + 0.10\,(340\text{-}B)$$

in which:

G = A.P.I. (60/60)
A = aniline point, °F.
B = midboiling point, °F.

The properties of several hydrocarbons are:

	B.P.	C.F.	A.P.	K.B.
n-Hexane	155.8	12.9	156	25.5
Neohexane	121.5	12.9	178	24.4
n-Heptane	209.1	12.8	159	25.4
Triptane	177.6	12.5	162	29.1
o-Xylene	292.1	10.3	47	106.8
m-Xylene	282.6	10.5	50	102.8
p-Xylene	281.3	10.5	51	97.3
Ethyl benzene	277.7	10.4	50	98.6

The figures on this page were obtained by a correlation of the Harvey and Mills data as well as numerous other data from the following references:

1. Woods, G. M., Preparation of Solvent Naphthas from East Texas Heavy Naphtha, Pet. Engineer, June 1936, p. 107.
2. Conine, R. C., Highly Specialized Petroleum Naphthas . . ., The Oil and Gas Journal, March 30, 1933, p. 66.
3. Lazar, A., Varnish and Lacquer Diluents, Ind. Eng. Chem., 28, 658, June 1936.
4. McArdle and Robertson, Solvent Properties of Isomeric Paraffins, Ind. Eng. Chem., 34, 1005 (1942).
5. Kurtz, et al., The Solvency of Petroleum Spirits, Ind. Eng. Chem. Anal. Ed., 11, 476 (1939).
6. Sweeney and McArdle, Highly Aromatic Petroleum Solvent Naphthas, Ind. Eng. Chem., 33, 787 (1941).
7. Toby, Jr., E. M., Petroleum Solvents, Ind. Eng. Chem., 35, 1044 (1943).

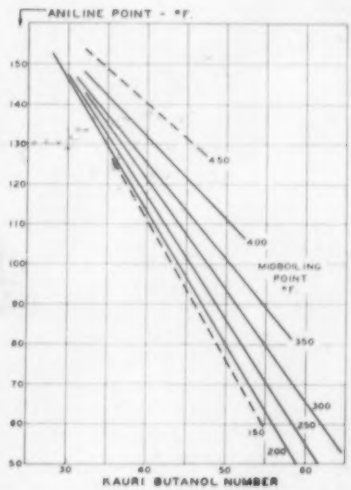


Fig. 3—Approximate relationship between Kauri butanol number and aniline point for petroleum naphthas.

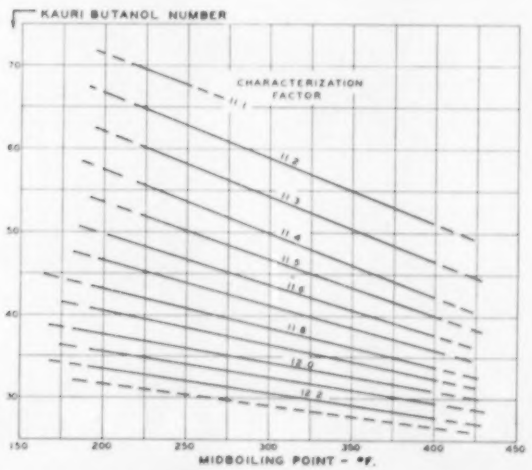


Fig. 1—Kauri butanol number as a function of midboiling point and characterization factor.

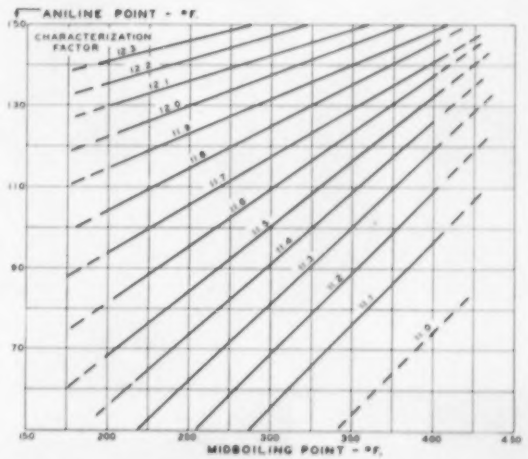
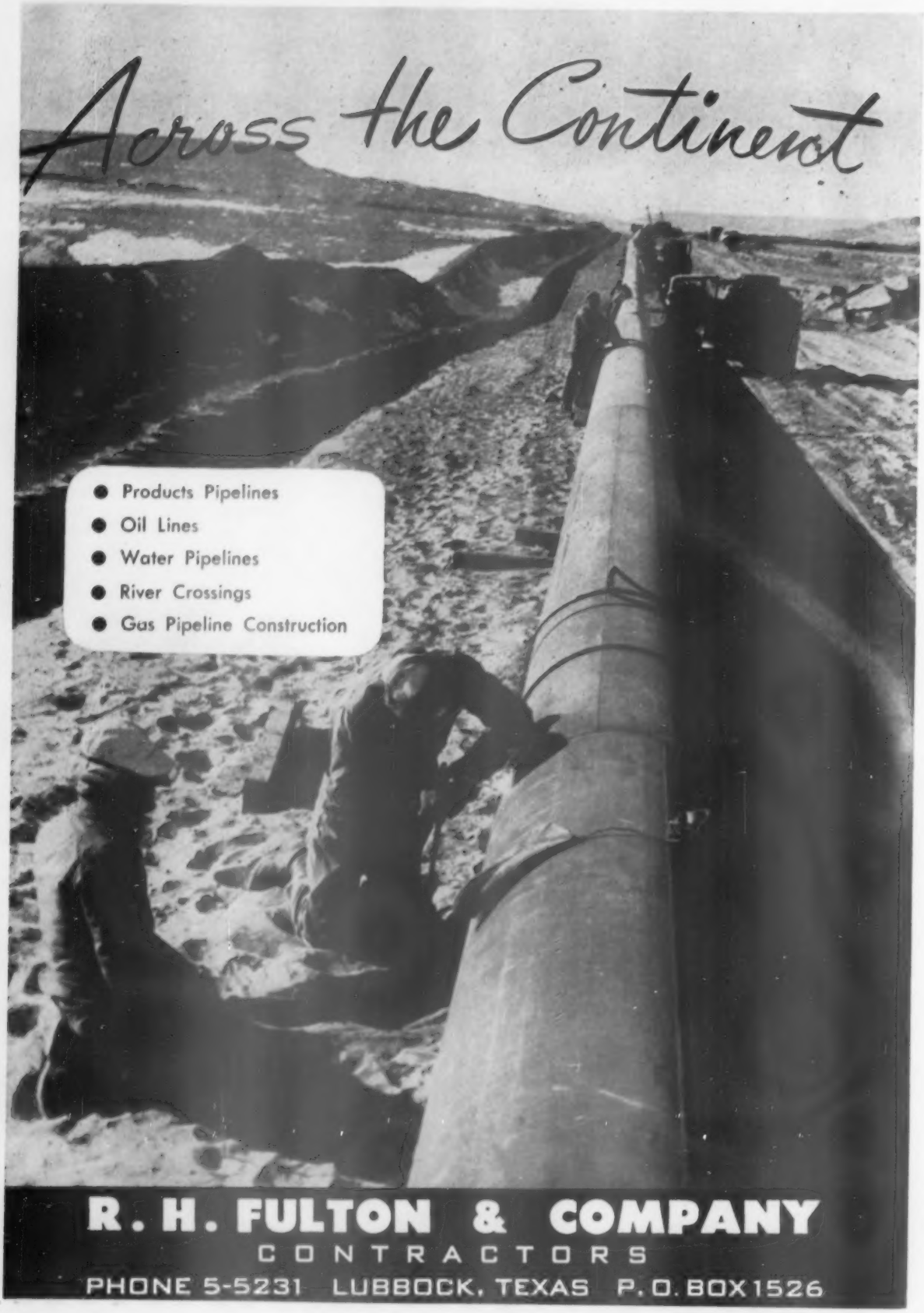


Fig. 2—Aniline point of petroleum naphthas related to midboiling point and type of crude oil.


Across the Continent
Products Pipelines
Oil Lines
Water Pipelines
River Crossings
Gas Pipeline Construction
R. H. FULTON & COMPANY
CONTRACTORS
PHONE 5-5231 LUBBOCK, TEXAS P. O. BOX 1526

Maintenance welding on operating H.-P. gas lines

by H. A. Proctor

SATISFACTORY procedures for maintenance welding on high-pressure gas lines have been developed by Southern California Gas Co. as a result of several years' study of the problem. Maintenance of this type, whether for leak repair or for making connections, demands sound training of welders, well-planned methods, and adequate safety precautions.

Though welding methods involved in construction of pipelines are well on the way to standardization, no such situation exists where maintenance is concerned. In this phase of welding, individual companies have developed their own procedures and methods which many times are not known outside of the particular company. This discussion, then, relates to the practices used by Southern California Gas Co. and by Southern Counties Gas Co. on

Author is with Southern California Gas Co.; paper was presented at the Gas Supply, Transmission, and Storage Conference of Operating Section of American Gas Association, March 4, 1954, New Orleans.

Fig. 1—Typical connections made on a 30-in. pipe joint under pressure as part of a welder-training program.

Fig. 2—Test samples failed in bending test when welds were made with pipe temperatures held at 32° F.

Fig. 3—Satisfactory welds were obtained when pipe temperatures were held at 125° F.

Fig. 4—Temporary venting head with gasket which is placed over leak and held in place with straps and bolts.

Fig. 5—Vent is in place and workman prepares pipe surface for welding of permanent leak clamp. Longitudinal weld bead is also ground flush so clamp will fit properly.

Fig. 6—Sleeve segment with gasket cemented in place. Segment is corrugated to fit over weld.

Install and forget 'em!

"Install, feed and forget 'em." This is how one oldtime customer describes his experience with Gaso Pumps and their ability to deliver continuous performance under peak loads with minimum attention and maintenance. *High* efficiency resulting in *low* pumping cost per barrel is what buyers look for in pumps, and get unfailingly in GASO Pumps. Have you a copy of our 1954-55 catalog?

GASO PUMP & BURNER MFG. CO.

TULSA, OKLAHOMA

EXPORT OFFICE: 149 Broadway, New York

LUFKIN MACHINE CO., Ltd., Edmonton, Alberta
W. L. SOMNER COMPANY, Shreveport, Louisiana
Tinsley, Mississippi • Brookhaven, Mississippi • Odessa, Texas
BUDA ENGINE & EQUIPMENT CO., Los Angeles, Calif.
Long Beach, Calif. • Bakersfield, Calif.
PEDDLERS, INC., Houston, Texas
NORTEX ENGINE & EQUIPMENT CO., Wichita Falls, Texas
LUFKIN FOUNDRY & MACHINE CO., Casper, Wyoming

GASO PUMPS

for every oil industry need

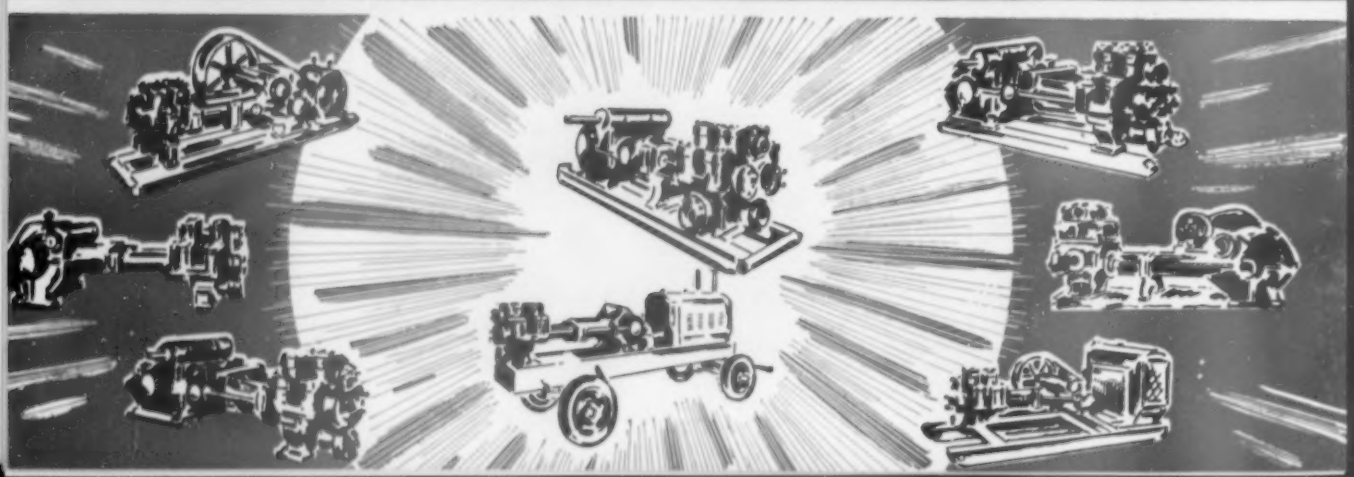


Fig. 7—Sleeve segments are held in place with chains until welding can be done. Gas is vented through valve and stack at this time.

Fig. 8—In completed repair job the sleeve is welded all around and vent outlet is plugged, capped, and seal welded.

highly stressed lines up to and including 30-in. diameter and pressures up to 800 psi.

Welding on high-pressure lines is done for three basic reasons: (1) attachment of connections, (2) repair of leaks and damage to pipe, and (3) replacement of sections of pipeline.

All these operations may be performed under emergency conditions when it becomes imperative to either keep a line in operation or return a line to operation with the least possible delay. Even under the most adverse conditions the welding must be of a satisfactory quality and must be performed under conditions providing adequate safety to the personnel.

To accomplish these objectives we have developed a program which is made up of these three steps: (1) adequate training of welders, (2) development of procedures, and (3) training of supervisors or inspectors to evaluate results.

Training of welders . . . Only our own company welders are used when working on highly stressed, operative pipelines. Therefore, it becomes of great importance to provide an adequate welder-training program. Prospective welders are usually secured from the helper classification—one who is already acquainted with the various aspects of gas handling. Training is done in our own welding school and it includes in addition to the mechanics of learning to weld, methods and procedures for welding on operative pipelines. Emphasis is placed on necessary safety precautions. The welder is taught how to prevent burning through the pipe wall and what happens when he does burn through. Instruction is usually completed within 8 weeks.

Welding procedures . . . These are established for the various types of maintenance welding. In many cases experimental connections are made and tested to verify procedures. (Fig. 1). Welding procedures include the selection of electrode and the technique to be used for particular conditions. Emphasis has been placed on the importance of minimizing arc burns and the adverse effect of arc burns is demonstrated by making bend tests on plate specimens with and without arc burn. In almost all cases the specimens with an arc burn will crack while the one without the arc burn will bend 180°.

Emphasis is also placed on the importance of preheating when working on operative pipelines because of the increased rate of cooling due to the flow of gas in the pipe. This is demonstrated by specimens that have been welded at lower temperatures as compared with those where preheat has been employed. Figs. 2 and 3 illustrate the importance of temperature control.

Quality control . . . Inspection and quality control is the last part of our three-step program. On most of our crews the foreman is an ex-company welder and generally is inclined to be more critical of the welder's work than perhaps a welding inspector. There is also the advantage that the foreman can recognize any bad habits of a welder and can help him to correct them.

Quality control is therefore achieved primarily through close supervision by the foreman. In addition, occasional

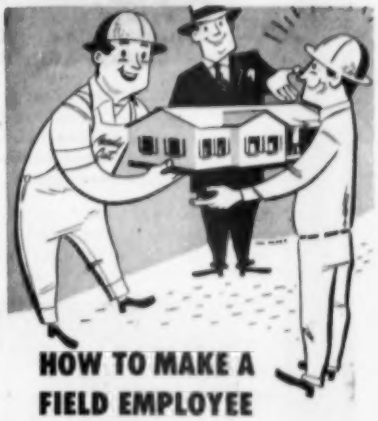
ARMSTRONG BROS.
Better PIPE TOOLS

CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes, fittings, etc.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5204 W. ARMSTRONG AVENUE - CHICAGO 30, ILL.



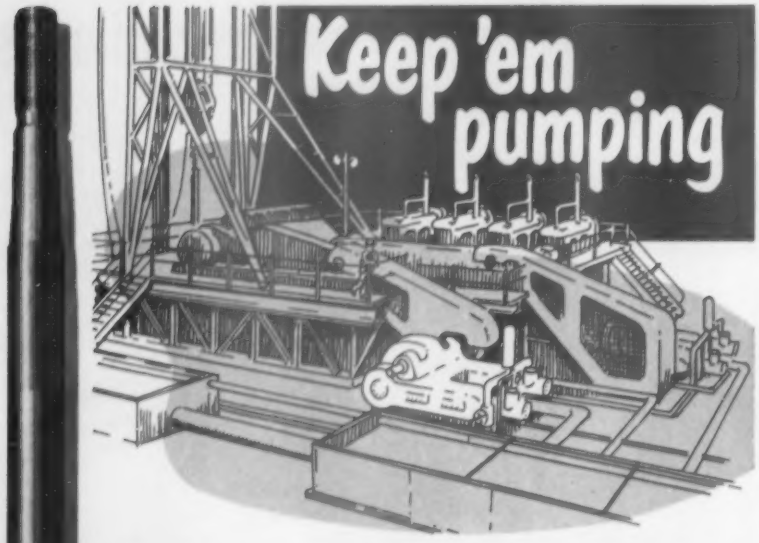
HOW TO MAKE A FIELD EMPLOYEE HAPPY...

Ready-Cut HOUSTON HOMES are popular throughout industries that require field housing. They're top quality in design, materials, workmanship, extras. They're available immediately from ready-cut, prefabricated stock.

- PLANNING and ERECTION SERVICES
- LEASE RENTAL HOUSING PROGRAMS

Write or phone for specifications and quotations.

HOUSTON Ready-Cut HOUSE CO.
Prefabricators Since 1917



Colmonoy No.6 hard-faced Slush Pump Rods stay in service Five Times Longer!

Prevent unnecessary shutdowns to replace worn rods and packing. Use rods that are hard-faced with COLMONOY No. 6. This miracle alloy has great resistance to abrasive and corrosive conditions, and is so smooth it reduces stuffing box repacking to a new minimum.

COLMONOY No. 6 is sprayed on in powder form, making a smooth, even overlay. This is welded to the rod with an oxy-acetylene flame. Only finish grinding is needed to put the part into service, to last 5 times as long as it would before hard-facing.

COLMONOY No. 6 is used on various pump and valve parts throughout the producing field and the refinery. Write us for the name of your nearest shop doing Spraywelding.

Above is a pump rod being Spraywelded with Colmonoy No. 6. At left is a slush pump rod that has been hard-faced with Colmonoy No. 6.

GET THIS COLMONOY HARD-FACING MANUAL
WRITE TODAY

HARD-FACING ALLOYS

19345 JOHN R STREET **WALL COLMONOY** DETROIT 3, MICHIGAN
CORPORATION

BRANCHES: BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON
LINDEN • LOS ANGELES • PITTSBURGH • MONTREAL • GREAT BRITAIN

radiographic examination on a sampling basis is used, or destructive tests of cut out welds are made. All welders are returned to the welding school once a year for retesting and schooling in new or improved methods. On this basis, we believe a uniform high standard quality of welding is secured.

Repair procedures . . . The repairing of leaks on large, highly stressed lines requires careful advance planning to insure the safety of personnel and the pipeline. Generally small leaks, such as in welds or at wrinkle bends, are repaired by welding vented sleeves over the leak with the line at operating pressure. In the case of large, blowing leaks, it is of course necessary to reduce the operating pressure and, on rare occasions, to take the line out of service while making a repair. This discussion is limited to those cases where the repair is made while the line is at operating pressure.

Full 360° welding sleeves rather than patches are used for repairs in order to minimize stress concentrations in the pipe wall. Welding sleeves are fabricated in 180° segments with a center corrugation of suitable cross-section to fit over a girth weld or wrinkle bend. Three widths of sleeves have been used in connection with our 30-in. Texas line; 6 in. wide for girth weld repairs, 12 in. wide for repairs to longitudinal welds, and 13¼ in. wide for installing over wrinkles. Defects found in the longitudinal welds were localized and, for the most part, were located in manual repairs made in the weld before the line was placed in operation.

When a leak is uncovered, a temporary venting head with gasket is placed over the leak and held in place with a strap and bolts. (Fig. 4). After the leakage is confined to the head and vented through the stack, the protective pipe coating is removed. A workman with a pneumatic sander and grinder cleans the circumference of the pipe to a bright surface and the longitudinal weld reinforcement is ground flush with the pipe wall to insure that the sleeve will fit properly. (Fig. 5).

Hole Cut in Center

In the meantime (Fig. 6), a hole is cut in the center of one of the 180° sleeve segments and a ½-in.-thick rubber gasket, slotted in the center and shaped to fit the corrugation, is cemented to the inside of the sleeve. An extra-strong steel abandoning nipple is welded over the hole in the sleeve to provide a vent for leakage when the sleeve is welded to the pipe. These nipples have an inner steel plug with a slotted head and an outside steel cap.

Both 180° sleeve segments are then

fitted over the pipe and held in place with chains and binders (Fig. 7). A gate valve and stack are temporarily installed on the abandoning nipple and the sleeve is then welded to the pipe. After welding is completed stack pipe is removed and the inner steel plug is inserted in the abandoning nipple.

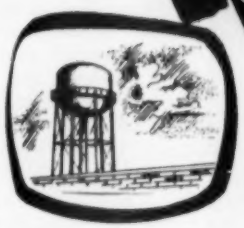
This is accomplished by first tack welding a ⅜-in. left-hand-threaded nut to the top of the steel plug and then, with the use of a Mueller E-4 tapping machine with an inserting tool, installing the plug under pressure control. When the plug starts to tighten, the left-hand thread of the inserting tool backs out of the nut tack welded to the top of the plug. The machine and gate valve can then be removed. The inner plug is tightened and the outside steel cap installed and seal welded. Fig. 8 shows a completed repair of a leak in a girth weld on the bottom of the pipe adjacent to an A-frame support.

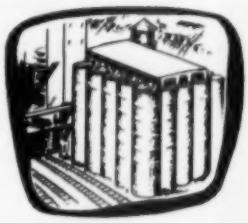
This type of repair is easily made on high-pressure lines since no attempt is made to stop the leakage until after the sleeve is completely welded to the line. Even though the repair is made while gas is being vented, the use of the abandoning nipple results in a completely welded job with no danger of leaks later developing at the threads.

When installing connections on or replacing sections of a highly stressed pipeline, the procedures are very similar to those used on lower pressure lines.

Many repairs made in the manner discussed have been tested in actual operation for over 5 years. Experience has proved the adequacy of this method.

"Don't hand me any more of that alligator stuff, boys—we're 10 miles from the swamps by now."





Your maintenance costs go down and plant efficiency goes up when you use Aluminum Paint in your maintenance program. For, remember the paint is only a small part of the cost of painting.

It's the longer life, lower overall cost and the many other values that make Aluminum Paint the best maintenance buy. Resistant to moisture and heat, reflecting light and heat rays, reducing storage tank and other evaporating losses, brightening plant interiors—these and a host of other extra values and added protection are provided.

Save on *your* plant maintenance costs by adding those extra years between repainting which Aluminum painting makes possible. Constantly held to top standards, MD Aluminum Pigments, used by a large number of leading paint manufacturers in the making of Aluminum Paint, are your assurance of the *best* for your maintenance painting requirements.

For ideas as to where Aluminum Paint can best be used in your general plant maintenance work, write today for your copy of the new ALUMINUM PAINTING HANDBOOK.

MD
METAL POWDERS
METAL PIGMENTS
METAL ABRASIVES
Since 1916

METALS DISINTEGRATING COMPANY, INC.
Elizabeth B, New Jersey
Plants: Elizabeth, N. J., Manchester, N. H., Berkeley, Calif., Emeryville, Calif.

WORLD'S LARGEST MANUFACTURER OF FINELY DIVIDED METALS

...dollar per dollar

b.t.u. per b.t.u.....

PETROCHEM-ISOFLOW FURNACES

are most efficient by any comparison!

BETTER HEAT DISTRIBUTION
MAXIMUM FUEL EFFICIENCY
LOW PRESSURE DROP
LOW MAINTENANCE
ZERO AIR LEAKAGE
EXPLOSION RESISTANT
MINIMUM GROUND SPACE
SHORT LENGTH OF LIQUID TRAVEL
EXCESS DRAFT FOR HIGH OVERLOAD
PLENUM CHAMBERS FOR HAZARDOUS AREAS

UNIFORM HEAT DISTRIBUTION

Uniform heat distribution, the most desirable characteristic of any fluid heater, is created in an Isoflow furnace as the result of the following design characteristics:

1. Individual burners, symmetrically spaced with relation to the tubes, create a symmetrical flame pattern with relation to the heating elements.

2. The metal cone at the top of the combustion chamber re-radiates to the tubes, also diverts products of combustion progressively closer to the tubes, and combines the proper proportion of radiant and convection heat to give the uniform heat intensity at the upper portion of the combustion chamber.

3. The combustion gases are diverted behind the tubes so that the gases recirculate from the top of the heater downward, behind and between the tubes, thus increasing the heat input to the rear of the heating elements by convection.

4. The recirculated gases also serve to reduce the combustion temperature, reducing the heat intensity at the bottom of the furnace.

The above design facors in Isoflow heaters, combined with the angle of the cone, provide the uniform heat distribution required in heaters for the most efficient process operation.

—most efficient by any comparison.

More than 1150 are in operation throughout the world in the petroleum, chemical and allied industries . . . for all processes and for any duty, pressure, temperature and efficiency . . . and all Petrochem-Isoflow Furnaces are pre-eminently satisfactory.

PETROCHEM-ISOFLOW FURNACES

UNLIMITED IN SIZE . . . CAPACITY . . . DUTY

PETRO-CHEM DEVELOPMENT CO., INCORPORATED

527 FIFTH AVENUE, NEW YORK 17, N. Y.

Representatives: Bethlehem Supply, Tulsa and Houston · Flagg, Brackett & Durgin, Boston · D. D. Foster, Pittsburgh · Fonville-Lovally, Chicago · Lester Oberholtz, California · Gordon D. Hardin, Louisville, Kentucky · Turbex Equipment Co., Norberth, Pa.

REFINING

Platforming Boom

Texaco adding nine units in big expansion program

NEW YORK.—The Texas Co. will begin work this summer on the final two of nine Platforming units being erected in a construction program costing more than $275,000,000.

Construction will begin this summer on a 11,000-bbl. per day Platformer at the Lockport, Ill., refinery and on a 9,000-bbl. per day Platformer at the West Tulsa refinery.

In addition to the Platformers, the expansion program includes three alkylation units, a Hydrotreater, and a butane isomeration unit. One of the alkylate units will be built at the Lockport plant. This unit will have a 1,000-bbl. per day capacity.

The expansion program will bring Texaco's Platforming capacity to over 18 per cent of crude capacity. The nine units will have a daily capacity of 103,100 bbl.

Two 20,000-bbl. per day Platformers are under construction at the Port Arthur refinery. The first unit is scheduled for completion early this summer while the second was only started last month. Eagle Point, N. J., has a 12,000-bbl. per day unit building, plus a 1,926-bbl. per day alkylation unit.

At Wilmington, Calif., the company is installing a 10,000-bbl. per day Platformer and an isomeration unit to produce 1,000 bbl. per day of isobutane. Included in this project is a 10,000-bbl. per day Hydrotreater which will utilize Platformer hydrogen to upgrade cracked naphthas.

Work began in April on a 13,000-bbl. per day Platformer at Lawrenceville, Ill., where a 2,250-bbl. per day alkylate unit also is going up.

In addition to these projects, the company is expanding and modernizing the El Paso and Amarillo refineries with new crude units, coking facilities, and Platformers.

Shell Appeals Decision

AUSTIN.—Shell Oil Co. and Shell Chemical Co. have petitioned the Texas Supreme Court to reverse its holding that the city of Deer Park, Tex., was within its rights in annexing land occupied by Shell's refinery and chemical plant.

The court held early in April that Texas' 1953 small-city validating act had legalized the Dec. Park annexation.

Shell argues in its motion that an amendment to the 1953 act passed during the recent special session of the Texas legislature provides that the 1953 act should not apply to any city which had litigation pending concerning its boundaries when the act was passed. The amendment, SB 10, was signed by Gov. Allan Shivers, April 19.

Jet Fuel Bids Vary According to Types

WASHINGTON.—Bids for jet fuel nearly doubled the government requirements on one type and fell short on another type recently the Armed Services Petroleum Purchasing Agency says.

The ASPPA requested bids on 35,000,000 bbl. of JP-4 fuel and received bids for 69,000,000 bbl. while requests for 3,300,000 bbl. of JP-3 fuel drew offers of only 2,400,000 bbl.

The government agency reported that Gulf Coast f.o.b. tanker prices ranged from 8.48 to 9.75 cents a gallon while West Coast prices varied from 10 to 11 cents.

Bechtel Given Contract

SAN FRANCISCO. — The Bechtel Corp. has been awarded a contract for the design and construction of twin catalytic reforming plants at Standard Oil Co. of California's Richmond and El Segundo refineries.

The two projects, scheduled to begin immediately, comprise the nucleus of a $30,000,000 refinery program designed to increase octane ratings of Standard's gasolines. Both plants are expected to be ready for operation by the spring of 1955.

Refining Briefs

WHITING, Ind.—Standard Oil Co. (Ind.) has licensed Canadian Petrofina, Ltd., to use its ultraforming process. Ultraforming, designed by Standard's engineers at Whiting, Ind., uses a platinum catalyst to reform low-octane gasoline to very high-octane gasoline.

LOS ANGELES. — Union Oil Co. the construction work in approximately for additions to its Brea research plant near here. The company plans to finish the contsruction work in approximately a year.

See Composite and Refinery Catalogs, or Write for Folder On

FLEET-LINE

PIPE SADDLES AND REDUCERS

Immediate Delivery

STEEL FORGINGS, Inc.

P. O. Box 2768 • Shreveport, La.

Foot of Fannin Street

NEW! Write for Bulletin.

Patented

PIPELINE VENTS AND MARKERS

FLEET-LINE CO.

P. O. BOX 2768

SHREVEPORT, LOUISIANA

TO CHANGE YOUR ADDRESS

IT'S BEST . . .

to send your old address clipped from the Journal mailing envelope along with your new location.

ADVANCE NOTICE . . .

10 days before you move, and we guarantee you week-to-week undelayed service.

WRITE . . .

Circulation Department

THE OIL AND GAS JOURNAL

Box 1260 Tulsa 1, Okla.

BLACK WHITE VISIBILITY

JERGUSON Series #5 Reflex Gages Give you up to 19¼" of Clear Visibility

THE sharp black-white contrast of the liquid level against the empty space above, in Jerguson Series #5 Reflex Gages, makes possible highly accurate liquid level readings even where lighting is poor.

To give you extra long service, the gages are corrosion resistant; and the glasses are specially treated with Jerguson Anti-Fouling Compound to give clearest visibility over a long period.

Series #5 Low Pressure Reflex Gages are available in sections to give you any desired total gage length. Materials used are selected to conform to or exceed the rigid requirements of A.I.S.I., A.S.T.M., and/or A.P.I.-A.S.M.E. specifications.

You can depend on Jerguson Gages. Write today for full information on Series #5 Gages, or for help on any gage problem.

JERGUSON

Gages and Valves for the Observation of Liquids and Levels

JERGUSON GAGE & VALVE COMPANY
100 Fellsway, Somerville 45, Mass.
Offices in Major Cities
Jerguson Tress Gage & Valve Co., Ltd., London, Eng.
Pétrole Service, Paris, France

Petrochemicals

Allied Nitrogen Plant Slated for Expansion

HOPEWELL, Va. — The Nitrogen Division of Allied Chemical & Dye Corp. has completed plans for expanding the ammonia capacity at Hopewell, Va., by 50,000 tons per year. The project includes new facilities for converting ammonia to nitrogen solutions.

Including last year's expansion of basic ammonia capacity at Hopewell, the expanded capacity at South Point, Ohio, and the company's new 200-ton per day plant just placed on stream at Omaha, Neb., Allied's Nitrogen Division now has the capacity for producing over 1,660 tons of ammonia per day, all from natural gas. The second Hopewell expansion will put total capacity over 1,800 tons per day.

Benzene Survey Slated By Government Agency

WASHINGTON.—The Business and Defense Services Administration has announced that it is preparing an extensive survey to determine the capacity and raw materials requirements of the benzene industry. This will be the third report in a current series of surveys which will cover all key chemicals produced in the United States. Many of these chemicals will be of petroleum or natural-gas origin.

Jefferson to Expand Port Neches Facilities

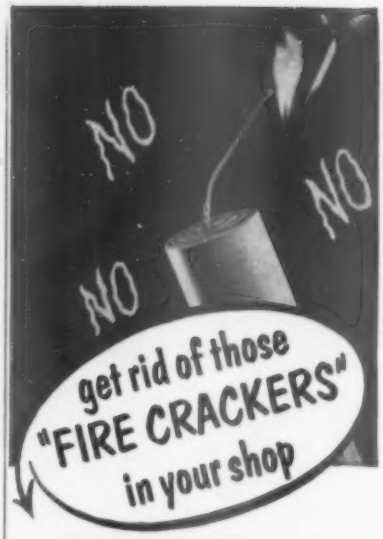
PORT NECHES, Tex. — Jefferson Chemical Co., Inc., will expand its ethanolamine production facilities here by 50 per cent to manufacture morpholine, a versatile chemical intermediate which was recently added to the company's list.

Besides enlarging the unit, the expansion will also allow the company to produce a greater variety of mono-, di-, and triethanolamine for storage or immediate sale as products.

Spensol Plant Planned

KANSAS CITY, Mo. — Spencer Chemical Co. has authorized a $1,750,000 expansion program to add nitric acid facilities and a Spensol plant at its Henderson Works in Henderson, Ky.

The nitric acid plant will be new while the Spensol plant is being moved from Charlestown, Ind., where Spencer formerly operated a plant.



What fire crackers? We mean those welding and cutting torches that keep popping—back-firing—burning out valve seats. Did you know that the ingenious new Smith "FLO-TROL" prevents reverse flow of acetylene—protects torch against backfire and burned out seats?

Write us a card . . . NOW!

SMITH WELDING EQUIPMENT CORPORATION
Dept. OGJ 82, 2633 S.E. 4th St., Minneapolis, Minn.

Write or Wire for Monthly Stock Lists

- **VALVES**
- **PRESSURE TUBING**
- **STEEL**

Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36-A
Shreveport, La.

OIL ROTS RUBBER

IS YOUR FIRE HOSE SAFE?

GET **Bi-Kleen**
THE HOSE CLEANER
THAT FIRE DEPARTMENTS USE!

When cotton rubber-lined fire hose contacts oil or dirt, it's washed *immediately* in safe, non-toxic *Bi-Kleen*, made exclusively for washing cotton hose — Send for a 10 lb. trial order today. Sold by the makers of the finest fire hose in the world — *Bi-Lateral* flat folding, non-creasing fire hose!

BI-LATERAL FIRE HOSE COMPANY
20 North Wacker Drive, Chicago 6, Ill.

HERE ARE 3 BIG REASONS *why* The PEERLESS HYDRO-LINE

ENCASED CLOSE-COUPLED PUMP

IS BEST SUITED TO MANY REFINERY AND FIELD PROCESSING APPLICATIONS

SPACE-SAVING AND COST-SAVING IN INSTALLATION . . .

Because of its vertical design the Peerless Hydro-Line pump occupies a small amount of floor space. Pre-assembled into a compact, integral unit, including driver, it can be uncrated and put on stream in minimum time and with a minimum of installation expense. Removal for inspection is accomplished without disturbing piping. Suction and discharge flanges are made to your standards.

CONSTRUCTION FLEXIBILITY MEETS FUTURE, AS WELL AS PRESENT SYSTEM NEEDS . . .

The vertical, multi-stage, turbine type construction of the Hydro-Line pump permits economical and quick installation of additional pump stages (bowl and impeller units) should future system demands exceed those of the installation for which the pump was initially installed. Further, removal to another location is expedient with Hydro-Line's type of construction.

EXCELLENTLY ADAPTED TO SYSTEMS WITH LIMITED NPSH . . .

With ordinary pumps, available NPSH is frequently insufficient for optimum operation. The Peerless Hydro-Line, multi-stage vertical turbine pump is especially designed for low available NPSH conditions. It is ideal for condensate return service and for pumping petroleum hydrocarbons, refrigerant mixtures and dilute alcohols.

HYDRO-LINE CHARACTERISTICS AT A GLANCE

APPLICATIONS
Especially suited for pumping hydrocarbons, such as gasoline, butane, propane, hot oils, etc. hot or cold water, mild acids, bases, salt solutions.

CAPACITIES
Up to 3000 gpm

HEADS
Up to 1500 feet

TEMPERATURES
From 0°F to 400°F

PRESSURES
Working pressures to 500 psi.

DRIVES
As required, standard vertical, solidshaft, hollowshaft or explosion-proof motors; steam turbine.

SEALING CHAMBER
Peerless mechanical shaft seal standard construction or packing gland furnished as required.

MATERIALS
Cast iron bowls, bronze impellers, #416 stainless steel shaft standard; any special materials can be furnished on order to suit individual requirements.

WRITE FOR NEW BULLETIN—Use the coupon at right to obtain your copy of Peerless Bulletin No. B-1700, which describes and illustrates the successful and exacting design, construction and performance characteristics of the Hydro-Line pump.

PEERLESS PUMPS
fmc

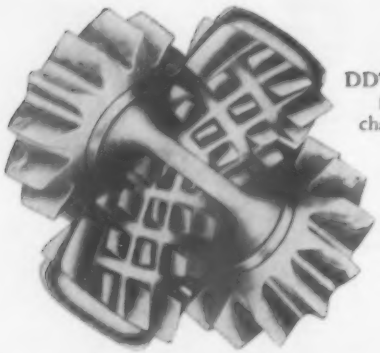
PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORP.
Address inquiries to Factories at: Los Angeles 31, California and Indianapolis 8, Indiana. *Offices:* New York, Chicago, St. Louis, Atlanta, Tulsa, Plainview and Lubbock, Texas; Fresno, Los Angeles, Phoenix, Albuquerque, New Mexico.
Distributors in Principal Cities; Consult your Telephone Directory

MAIL COUPON FOR BULLETIN

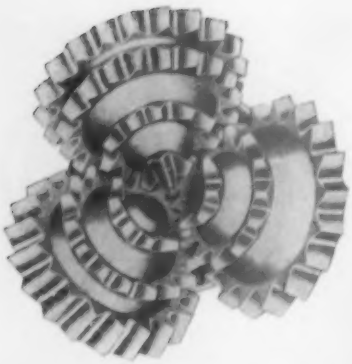
PEERLESS PUMP DIVISION
Food Machinery and Chemical Corporation
301 West Avenue 26
Los Angeles 31, California
Please send a copy of Peerless Hydro-Line Pump Bulletin No. B-1700.

NAME_____
COMPANY_____
STREET_____
CITY_____ STATE_____

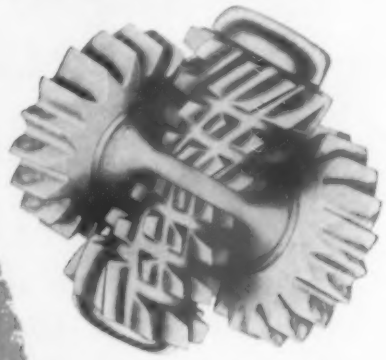
O.&G.J.



DDT—For long runs and greater footage in top formations—chalk, red beds, top shales and unconsolidated sands.

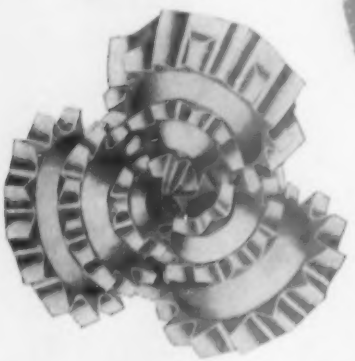


3C-2—For maximum action in harder, sharper formations—sandy shales, dolomite, hard lime and sandstones.

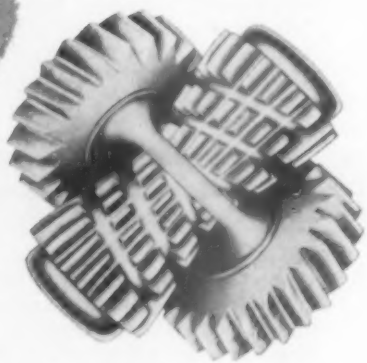


K2P—Rugged, long-tooth bit for medium to harder shales, chalks, red beds, limes and some conglomerates.

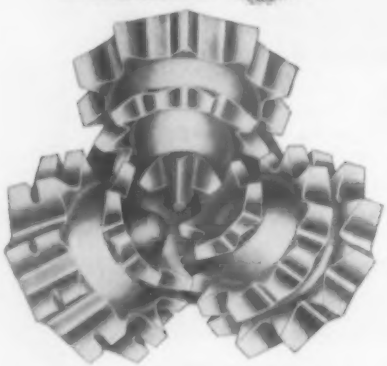
-every bit as good as the best



3C-K2—Designed for drilling soft to medium formations with streaks or layers of harder formations.



4—For maximum service under heavy weight in granite, chert, the harder sands and shales.



3C-DT—Fast-drilling, long-tooth bit for shales, anhydrite, chalk, medium limes and unconsolidated formations.

H C Smith
OIL TOOL CO.
GENERAL OFFICES, EXPORT OFFICE AND PLANT
COMPTON, CALIFORNIA

BRANCHES IN ALL PRINCIPAL OIL CENTERS IN THE UNITED STATES AND CANADA

Among the

Drilling Contractors

Tulsa Operators Form Wyoming Drilling Firm

David Beach and J. A. Talbot, independent oil operators, and owners of Cimarron Drilling Co., Tulsa, have organized another contract drilling company, Cimarron Western Drilling Co., to operate in the active Clareton area, of Weston and Niobrara counties, in eastern Wyoming.

Cimarron Drilling Co., organized a year ago, will continue to operate in southern Oklahoma, where it has three rotary rigs.

It also has been announced that W. Keith Schuerman, formerly associated with McIntyre-Sherman-Cummings, independent oil firm, Tulsa, has joined the Beach and Talbot organization as administrative assistant for the two Cimarron drilling companies.

T & P Drilling Co. is starting another deep well for Phillips Petroleum Co. in the Lazy J area, of Lea County, southeastern New Mexico. The test, 1 Sapphire, is scheduled to go to the Wolfcamp zone around 10,000 ft. Location is in 33-13s-32e.

McGregor Drilling Co., El Dorado, Ark., has been let contract to drill Atkins & Pannell Drilling Co.'s 3,600-ft. Travis Peak test at 1 Reynolds-Gammill Lumber Co., C NW SE NE 12-16s-15w, in the Smackover field area of Union County, south-central Arkansas. Bad road conditions have delayed the wildcat's operation.

H. T. Pannell, Stephens, Ark., holds contract to drill John Merritt, Trustee 1 Goad, C SE NW SW 14-14s-19w, northwest diagonal offset to the discovery well of Buena Vista field in Ouachita County, south-central Arkansas. The test lies 2¾ miles east-northeast of the town of Troy. Production will be sought to 2,500 ft. in the Tokio.

Como Drilling Co. has the contract for E. C. Wentworth's Wilcox test, 1 Edwards, being started at a wildcat location 6 miles northwest of Marksville, in 31-3n-4e, Avoyelles Parish, Central Louisiana.

Clyde Hall Drilling Co., Bakersfield, Calif., has contracted with MJM & M Oil Co. for a 9,000-ft. exploratory test in the Mountain View area, southeast of Bakersfield, in Kern County, California. The test, 18-20 Union-Atlantic-Wilson, in 20-30-29, has as its objective the Vedder horizon. Two shallower dry holes have been drilled by other operators in the area.

Santa Fe Drilling Co., Santa Fe Springs, Calif., has a contract to drill a series of 25 core holes on Humble Oil & Refining Co.'s vast spread of leases in the Sacramento Valley, in northern California. Locations for the core tests, which will be drilled to depths around 2,500 ft., extend from the San Francisco Bay area to Tehama County, the state's northernmost county.

Ernie A. Shamlen is contractor on an exploratory venture Southern Great Basin Oil & Gas Co., Inc., a Nevada corporation, is undertaking on a 6,000-acre block in Nevada. Location for the first test, 1 Las Vegas, in 17-17s-65e, is 30 miles northeast of Las Vegas.

Coastal Drilling Co., Los Angeles, is starting work on a projected 12,000-ft. exploratory test it has contracted to drill for Sunray Oil Corp. southwest of Greeley field, west of Bakersfield, in Kern County, California. Location lists the test as 21-30 Western Gulf-KCL, in 30-29-26.

Enterprise Oil Co., Bakersfield, Calif., is scheduled to drill a shallow (approximately 1,700 ft.) wildcat test for Intex Oil Co. about 2 miles west of Paso Robles, in northern San Luis Obispo County, California. Location is for 1 Sauret, in 25-26-11.

Buzzini Drilling Co. has moved its rig from the recently completed oil-discovery well it drilled for Francis J. Hynes, in southern DeWitt County, South Texas, and is starting a confirmation well for the same operation at a location to the north. The discovery well, 1 Lau, which opened Hynes field, produces from Wilcox sand at 8,181-83 ft.

Grace Drilling Co., Houston, is drilling an east outpost test to Port Barre field, St. Landry Parish, South Louisiana, on a contract with Harrell Oil Co. and associates, also of Houston. The

Get Full Joint make-up

A joint can be the weak link in your pumps, sucker rods and drill strings unless they are tightened to maximum make-up.

'Bestolife Lead Seal Tool Joint and Casing Compound keeps out mud, prevents corrosion, permits perfect thread and shoulder contact — yet separates easily years later. Unconditionally guaranteed. Sold at supply houses throughout the world. Packed in 1¼, 5, 20 and 50 lb. containers.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

An ALL-NEW mudline valve

Because... *Rockwell Built*

MUDWONDER'S

"open center" bonnet and large gate opening keep sand from settling or packing around gate and stem. MUDWONDER means...

NO "SANDING-UP"

Get complete information from your supply store today.

Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1492 W. 145th STREET
EAST CHICAGO (phone 231)
INDIANA

Bos-co

FRICTION TYPE

STARTER

FOR HORIZONTAL ENGINES

ASK THE MAN WHO OWNS ONE

- **Proven Performance**
- **Safer**
- **More Compact and Economical**
- **Easier to Operate**

Rubber covered pulley gives long wear, positive engagement.

Reduction gear eliminates jack shaft, V-belt drive and guard.

Available At Your Supply Store.

Bos-co

EQUIP'T ENG'R'G & MF'G.

526 South Boulder Ave., Tulsa, Oklahoma

And I'm hoping to have a chance to tell **you** all about it before long. ★ I've been around a lot of drilling hooks in the years I have been in the oil patch, but that new Web Wilson HYDRA HOOK is so **far out in front** that the others just don't count. ★ That "dash pot" action is something you have to try out to really appreciate, but **one look** will tell you it's the most compact, streamlined drilling hook ever made. And that soft, controlled action is mighty easy on tool joint threads. ★ Maybe we had better get together and go over ALL its good points, so just call me at Corpus Christi 2-5361 and I'll come a running!

E. E. (Gene) Buchner

test is listed as 1-A Sibille, with location in 7-6s-6e. This contractor has another new job under way at Jeanerette, in St. Mary Parish, where it is drilling for Kerr-McGee Oil Industries, Inc., of Oklahoma City, at 4 Bessie, in 39-13s-9e.

Owen Drilling Co. has a new operation under way on the northeast flank of Darrow dome, in Ascension Parish, Coastal Louisiana. It is a 9,850-ft. test being contracted for Temple Hargrove and associates, of Houston. Location is in 26-10s-2e.

J & C Drilling Co., Refugio, Tex., has a contract for 9,000-ft. wildcat test in northern Victoria County, South Texas, which will be drilled for Arnold O. Morgan and Gulf Oil Corp. Location is in the L. Navarro Survey, 2 miles southeast of Thomaston, on the operators' Atkinson lease.

Ace Drilling Co., Dallas, is drilling a 7,000-ft. Paluxy test for Thomas D. Humphrey & Sons at 1 Winnerbaum, in William Droddy Survey, about 6 miles west of Canton, in the west central part of Van Zandt County, East Texas.

Field Drilling Co., San Antonio, has a contract for a 9,000-ft. Wilcox wildcat test which W. Earl Rowe, Vega Corp., and John F. Camp, also of San Antonio, will drill at 1 Cross, in the Guadalupe College Survey, 7 miles south of Yorktown, in DeWitt County. Location is 3 miles south of Heinze field.

Sunnyland Contracting Co., Rayne, La., is moving a rig to a rank wildcat location on unsurveyed Destin Peninsula, near Choctawhatchee Bay, in Okaloosa County, Florida Panhandle, where it will drill a 6,250-ft. Massive sand test for H. L. Hawkins, of New Orleans. Location, 1 Kelly, is more than 25 miles from the nearest test ever drilled.

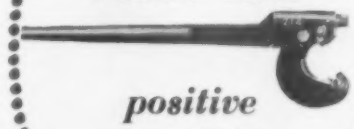
Milton Crow, Inc., Shreveport, is starting a Smackover exploratory test for Helmerich & Payne, Inc., at 1-A Powell, in 32-14s-24w, 3 miles southwest of Patmos, in southern Hempstead County, Arkansas. Location is northwest of Midway field. Objective is expected around 6,300 ft.

H.E.R. Drilling Co., Oklahoma City, has a rig working in Navajo County, Arizona, where it is under contract to Navajo Oil & Gas Co., of Los Angeles, for a test to 4,000 ft., of the granite. Location is in NW NW SW 1-16n-16e, on the Holbrook anticline.

RATIGAN

NO. 214

TUBING TONG



positive sure grip!

Lightweight, yet exceptionally strong and rugged. Interchangeable jaws for 2", 2½", and 3" size Tongs . . . quick and easy to change . . . assure positive sure grip. Sold through leading supply stores everywhere.

J. P. RATIGAN, Inc.

1213 Santa Fe Ave., Los Angeles 21

Export: National Supply Co., Inc., Export Div.

460 Fifth Ave., New York 20, N.Y.

THE PARCO COMPANY

INCORPORATED

PARCO

DESIGN PERTAINING TO ALL PHASES OF

Power, Petroleum and Chemical Plants

82 Beaver Street, New York 5, N. Y.

"Electronics **REDBOOK"**

INDUSTRIAL USERS:

Write on your letterhead for your FREE copy

INTERSTATE

ELECTRONICS SUPPLY CORP.

230 IDA — P. O. BOX 2018

WICHITA, KANS.

Pumping unit #21,636 gets its first "Physical"

Production equipment leads an awfully tiring and lonely existence. Erected on a permanent site, such equipment must function properly with very little human attention over great periods of time—and under every weather condition you can imagine.

Obviously such equipment must be extremely rugged. And, at every National Supply plant, we maintain complete staffs who daily check and measure for conformance to National's own unique, high quality standards in the manufacture of such production equipment.

Operating as "Metallurgical and Inspection Control Departments," these technicians begin by carefully checking the physical and chemical properties of the steel from which parts will be made (as the technician checking steel structure is doing above). This checking continues uninterrupted—high magnification examination of machined areas, hardness tests on vital parts, checking structure of normalized and tempered elements —right into final assembly and test, prior to shipment to the field.

Yes, continuing product improvement has always been a big part of National's traditional service to the oil industry—whether it be in the form of basic research, product development or daily manufacturing quality control. That's why the National Blue label is *your assurance of the best* in production and drilling equipment.

First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

THE
NATIONAL SUPPLY
COMPANY

PITTSBURGH 30, PENNSYLVANIA

For efficient, safe production, specify

NATIONAL

wellhead equipment

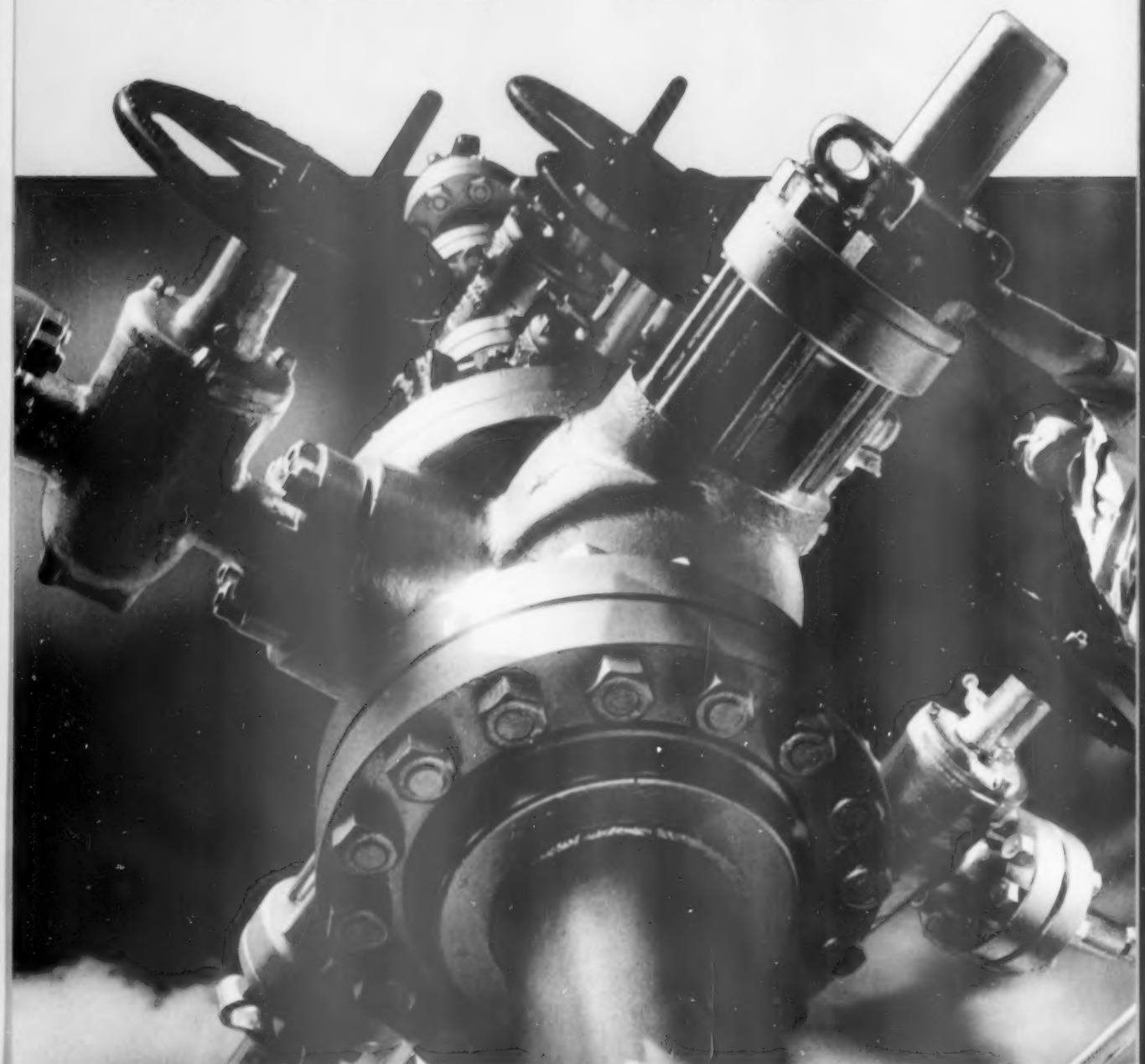
From the bonnet to the casing flange, every component part of National Wellhead Equipment is designed, built and tested for specific service application—to assure maximum performance with utmost safety. Like operators everywhere, you can specify this dependable equipment with the assurance that you will get:

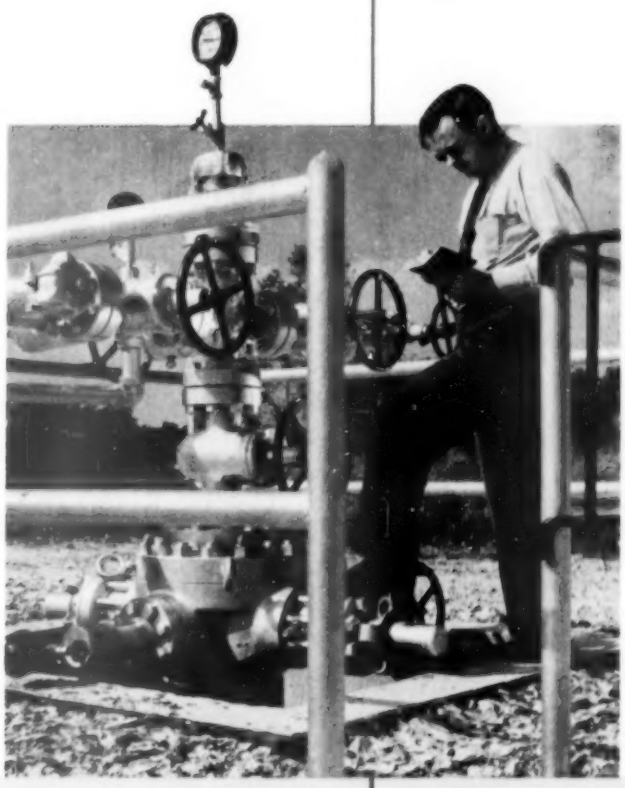
Maximum Flexibility—interchangeable units afford a multitude of combinations to meet your specific requirements in size, capacity and type.

Ease of Assembly—parts are self-locating and self-activating, no special tools needed for installation.

Pre-tested Safety—National's triple-sealed Pressure Pack design insures trouble-free performance and longer service life. Intensive testing procedures include special methods more severe than those specified by API standards.

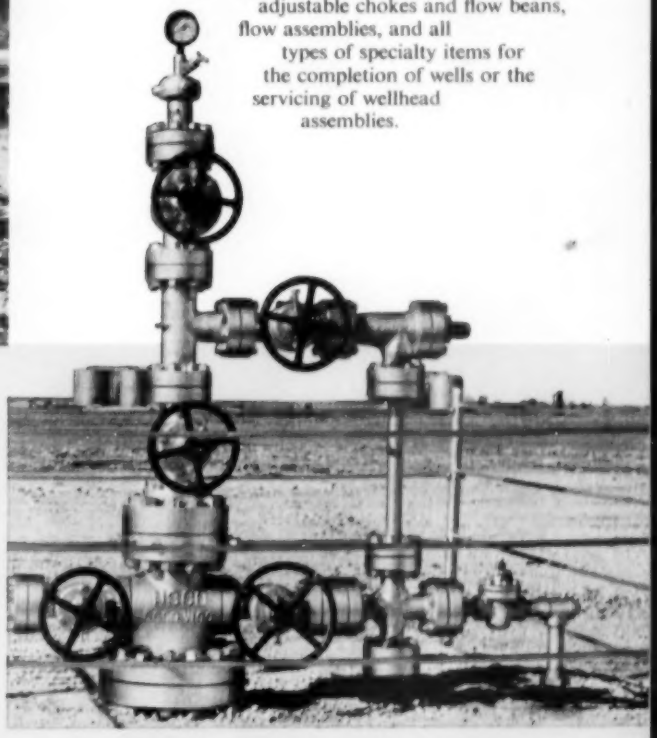
You can find National Wellhead Equipment readily available in the stocks at National Supply Stores throughout the United States and Canada—where you'll also find a National equipment specialist ready for consultation on your wellhead problems. Why not talk over your requirements with him now?

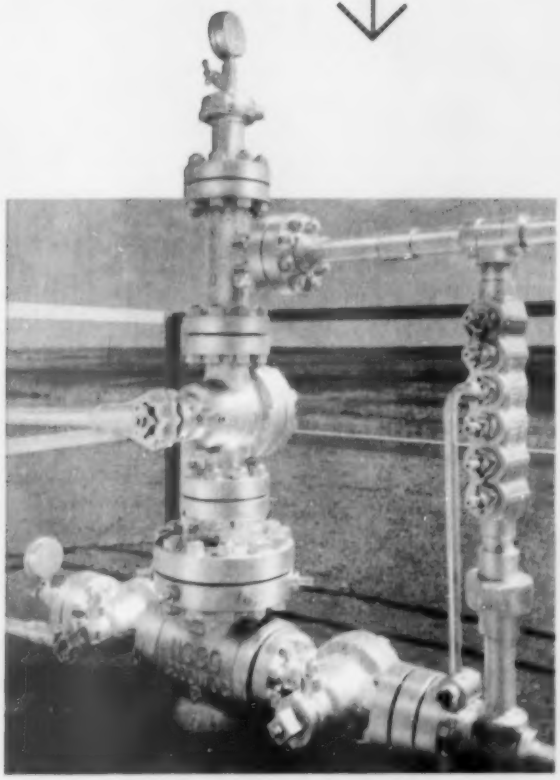




...there's a **NATIONAL**
Wellhead for production at any depth or working pressure!

National Supply's Houston plant and National Supply Stores everywhere can meet your wellhead needs with a wide variety of tubing hangers, bonnets, valves, flanged and threaded fittings, adjustable chokes and flow beans, flow assemblies, and all types of specialty items for the completion of wells or the servicing of wellhead assemblies.





First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

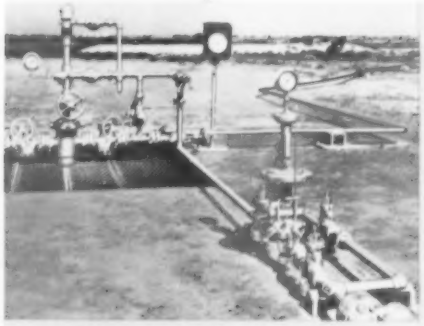
EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2

See the rest of the family of
National Production Equipment
on the next page

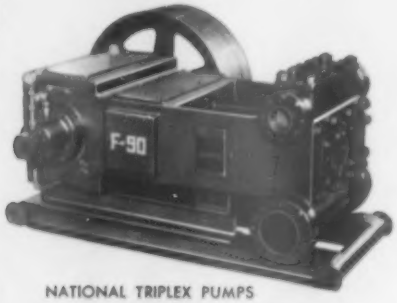
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

NATIONAL SUCKER RODS
are precision-manufactured in various grades to suit virtually all well conditions, and readily available at the National Supply Store nearest you.

NATIONAL PUMPING UNITS
are manufactured in 38 standard combinations, API rated from 3200 to 32,400 lbs.—there's a model to economically suit every pumping job.



NATIONAL'S PLUNGER LIFT
uses formation pressure for economically producing wells where reservoir conditions are suitable.



NATIONAL TRIPLEX PUMPS
are available in several HP ratings, with either low or high pressure fluid ends for waterflooding, salt water disposal, oil gathering or as power-oil sources for subsurface hydraulic pumping.

...for efficient recovery by any method, use

NATIONAL

production equipment

Designed to fulfill the requirements of modern production methods, the complete line of National Production Equipment includes units for recovery by any method. Every unit is designed, too, for trouble-free, profitable operation, and built to the most exacting material and manufacturing standards.

You'll find it worthwhile to get *all* the facts on National Production Equipment for primary and secondary operations. The National Supply Store nearest you will be glad to furnish product bulletins and any other information you may require.

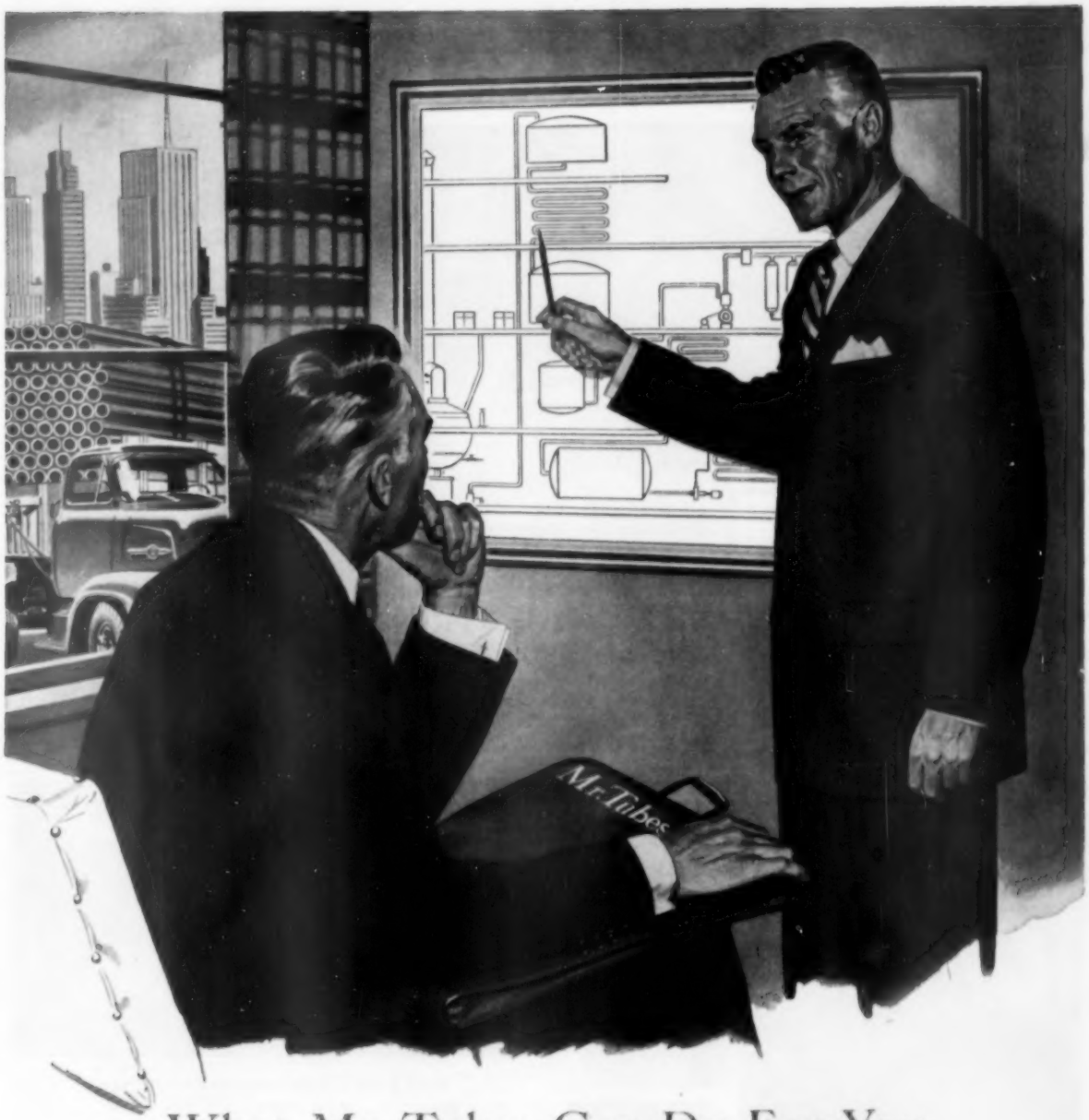
First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth, Houston, Pittsburgh, Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C.2



What Mr. Tubes Can Do For You

—about stainless steel tubing

Plenty! Corrosion and oxidation resistance, structural strength and appearance are only a few of the elements you want to consider in determining when and where to use stainless. Mr. Tubes can offer dependable help in obtaining the *best* grade and size to match the metal to your facilities and the end use you have in mind.

Mr. Tubes symbolizes the complete technical service enjoyed by users of B&W tubular products—available to you through B&W's headquarters technical staff, helpful regional representatives, and B&W's nationwide network of friendly, efficient tubing distributors.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

B&W SEAMLESS and WELDED TUBES

TA-1803(SSP)

Shortcuts for Drillers
with Simplex Jacks

SOMETIMES IT TAKES TWO . . . With right and left hand toes, respectively, Simplex Nos. 126 and 127 ratchet lowering geared jacks can be used as a pair for lifting and lowering rigs or other heavy equipment. 25-ton capacity on cap or toe. Powerful geared mechanism makes jack faster and easier to use than standard speed types.

BIG PULL . . . For your cable tightening and wire pulling jobs. Here's the Simplex Jack that works fast on slack cables, gives hefty pull for final tightening. No. 324 is light, handy to use.

OTHER SIMPLEX JACKS FOR DRILLERS include the famous "center-hole" Jenny and the Re-Mo-Trol, a remotely controlled ram and puller. There is also a complete line of Simplex hydraulic and screw jacks. General Catalog No. 53 lists them all—write for a free copy.

"THE MUD LINE STANDPIPE WAS POUNDING LIKE *!?*" according to the pumper, "so we jacked it up". This is only one way the versatile Simplex Emergency Jack offers an easy short-cut to problems in the oil country. With 15-tons capacity at four lift points, Model 310A also lifts, skids and levels rigs, moves and braces machinery, pulls positions, clamps and supports pipe.

LIFTS IN A HURRY . . . For extra speed and ease of handling on many heavy duty oil field lifting jobs. Simplex Model 2029 lifts 20-tons on cap *or* toe. Single acting, ratchet lowering lever type.

TEMPLETON, KENLY & CO.
2539 GARDNER ROAD, BROADVIEW, ILLINOIS
A. C. Templeton, 2627 Del Roy Drive, Dallas, Tex.

You Can Count On A JENSEN!

In the first place, you can count on a JENSEN Pumping Unit to last for a long, long time. During this time, you can count on dependable performance with a minimum of service. You can also count on very few parts . . . if any . . . being replaced.

Above all, you can count on a JENSEN Unit to pump oil efficiently and economically. See your JENSEN Dealer and get more facts. You'll be glad you did—and you can count on that, too!

JENSEN

BROS. MFG. CO., INC., Coffeyville, Kansas
EXPORT OFFICE: 50 Church St., New York City

IN VIRGINIA'S BLUE RIDGE HUNT COUNTRY

Long Branch

A Rare Opportunity to Purchase an Authentic Architectural Masterpiece

This distinguished home, considered the purest example of neo-classic architecture in Virginia, is the only Benjamin Latrobe house still a private residence. Scene of the 1953 Hunt Ball. 14 well-planned rooms. Exquisite interior details.

The Shenandoah Valley farm — owned by one family since 1830 — contains 560 acres of rich limestone soil. Woodlands and blue grass pasture, well-watered, offer optimum potential for productive use. For illus. brochure C-60466, ask your local broker or

PREVIEWS INC. *The Nationwide Marketing Service*
49 E. 53RD ST., NEW YORK 22 • PLAZA 8-2630
1518 WALNUT ST., PHILADELPHIA 2 • PE 5-1400
BOSTON • CHICAGO • DENVER • PALM BEACH
PARIS • LOS ANGELES • SAN FRANCISCO

Proficiency in Pipelining

With the combined experience in pipeline construction totaling many centuries, and spanning many sections of America, Houston Contracting Co. performance meets the highest standards of proficiency.

HOUSTON CONTRACTING COMPANY LTD.

General Partners:
Laurence H. Favrot
R. P. Gregory
Associate:
Geo. A. Peterkin

General Contractors

Oil - Gas - Gasoline - Water Pipe Lines
2707 FERNDALE HOUSTON 6, TEXAS

Stop Fires before they stop you

Use Ampco Safety Tools in hazardous locations

Employees do their best work when they know their tools are safe for the job. That's why you're money ahead when you insist on Ampco Safety Tools whenever there's a chance of fire or explosion — in spray booths, paint lockers, inflammable-liquid storage areas, or in the presence of explosive gases or dusts.

Factory Mutual Laboratories and other leading safety authorities know that the use of ordinary tools in hazardous locations often means disaster. That's why they approve and recommend Ampco Safety Tools for these spots.

Play safe! Use long-lasting Ampco Safety Tools. More than 400 different types and sizes. Order Ampco Safety Tools today for lower insurance rates, safer work, and better employee morale.

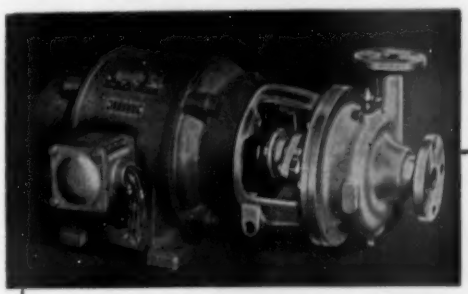
*Reg. U. S. Pat. Off.

AMPCO METAL INC.
Dept. OG-5
Milwaukee 46, Wis.

AMPCO

West of the Rockies it's Ampco Burbank Plant, Burbank, California.
In Canada Safety Supply Co., Toronto, Ontario

T-10A



A low-cost answer to many acid-pumping problems!

AMPCO* Centrifugal Pumps

Take the headache out of pumping acids — use Ampco Centrifugal Pumps. Made of Ampco aluminum bronzes, they have exceptional resistance to corrosion. And they also resist the damaging effects of cavitational erosion, deformation, and wear.

That's why Ampco Pumps are ideal for handling difficult liquids such as hot sulfuric acid, hot acetic acid, hydrofluoric acid, fatty acids — as well as dyestuffs, caustics, brine, and other corrosive liquids.

Best of all, Ampco Pumps sell at *standard pump prices* — even with all their extra advantages. They're available in sizes from fractional flow to 600 gpm — with close-coupled or pedestal mounting. Write for more information today.

AMPCO

AMPCO METAL, INC.
Dept. OG-5 • Milwaukee 46, Wis.
West Coast Plant: Burbank, Calif.

*Reg. U. S. Pat. Off. P-6

FASTER

MORE EFFECTIVE... MORE DEPENDABLE

FIRE-STOPPING POWER

MODEL 20-B

ANSUL
Chemical Company
FIRE EQUIPMENT DIVISION • MARINETTE, WISCONSIN

ANSUL

FIRE EXTINGUISHING EQUIPMENT

FASTER . . . A short, quick downward motion of the puncture lever pressurizes the extinguisher and it is ready for instant use.

MORE EFFECTIVE . . . Even the inexperienced operator gets near-expert results because of the ease of operation and handling. In addition ANSUL *"PLUS-FIFTY"* Dry Chemical has greater fire-killing power.

MORE DEPENDABLE . . . Exclusive ANSUL-ENGINEERED design features include water-tight and corrosion-resistant construction, easy, on-the-spot recharge without special tools and other exclusive Ansul developments which insure greater dependability.

FIRE-STOPPING POWER . . . ANSUL FIRE EXTINGUISHERS have the highest ratings for fire-stopping power ever awarded any type of class B and C fire extinguishing equipment.

Send for File No. B-210. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES

ANSUL

PROVIDES THE MOST COMPLETE LINE OF DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT

HAND PORTABLES

MODEL 4-C

MODEL 20-B

MODEL 30-B

NEW WHEELED PORTABLES

MODEL 150-B

MODEL 350-B

In Ansul's complete line of Fire Extinguishing Equipment there is a model of just the right size to adequately protect nearly every type and area of class B and C fire hazards in, or around, your plant. And, more important, even the largest capacity wheeled portable and stationary equipment by Ansul, is designed for quick, easy, one-man operation.

Ansul Fire Extinguishers are designed for maximum effectiveness even when used by inexperienced employees. They are easy to operate and can be quickly recharged "on-the-spot." No special tools are required for recharging, inspection or maintenance. In addition, all Ansul Equipment is water-tight and corrosion-resistant for longer, trouble-free service.

TRUCK MOUNTS, TRAILERS AND FIRE TRUCKS

MODEL J1-340

MODEL S-2000-B

PIPED SYSTEM

STATIONARY EXTINGUISHERS AND PIPED SYSTEMS

ANSUL
Chemical Company
FIRE EQUIPMENT DIVISION · MARINETTE, WISCONSIN

MANUFACTURERS OF DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT, REFRIGERATION PRODUCTS, INDUSTRIAL AND FINE CHEMICALS AND LIQUEFIED GASES

THOMPSON

SAND SEAL OFF INVERTED PUMPS

Figs. 600 - 700 - 800 & 900 In Regular Size and Large Capacity Oversize

Lower Your Lifting Cost by using Thompson Flush Valve combination Single or Double plunger self-aligning inverted pump equipped with Sand Flush valve which seals the plunger off on top and cleans the barrel every pump stroke.

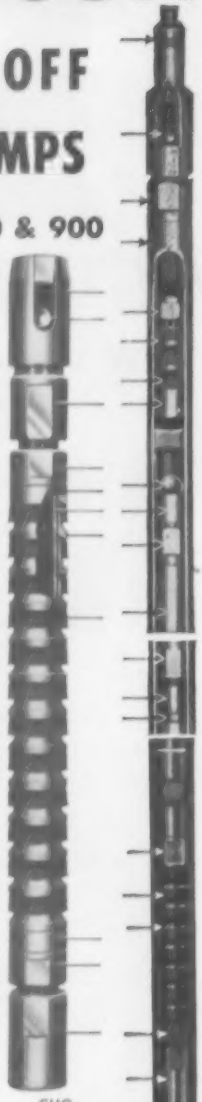
Sand is deposited into blind cage above the plunger and is discharged every stroke of the pump. The bottom of plunger is sealed to eliminate slippage. Easy on surface equipment. Can be run in any API Seating Nipple.

CUP PLUNGER ASSEMBLIES

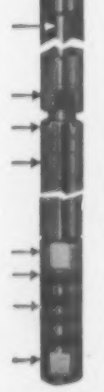
8-10-12-Cup in Regular and Large Capacity Oversize Bore.

Tubular cup cylinder valve body with cage head and ball and seat firmly locked on top, with Grooved Seal cup rings or sure-tite positive lock cup rings, bronze wear rings firmly locked together with cup body nuts and gives greater strength and efficiency, easy on rods and surface equipment.

Pumps for all fields, depths and conditions. For further information write for complete catalog.



CUG CUP PLUNGER



Figs. 600 - 700
Figs. 800 - 900

THOMPSON PUMP CO.

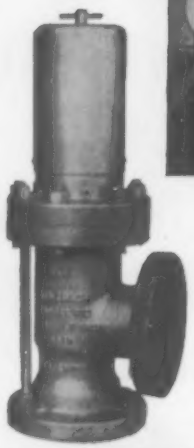
OKMULGEE, OKLAHOMA

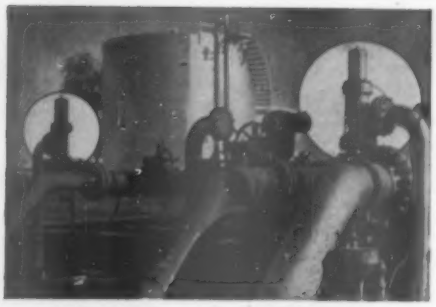
SUPPLY STORE STOCKS

Happy Co., Salem, Illinois
Stanley Brandt Oil Field Supply Co., Pampa, Texas
Mid Way Pipe & Supply Co., Greggton, Texas
B-H Pump Service, Selman City, Texas
Jack Yates Pipe & Supply Co., Gladewater, Texas

SALES & SERVICE STOCKS

Seminole, Okla.
Edmond, Okla.
Shidler, Okla.
Drumright, Okla.
Kilgore, Texas
Heidelberg, Miss.
Natchez, Miss.
Oil City, Miss.
Vivian, Louisiana
Big Rapids, Mich.
Stephens, Ark.





Positive Protection Against Pressure Surges

KINZBACH MODEL 412 RELIEF VALVE FOR PIPELINES AND REFINERIES

When a pressure overload in the line is reached, the Kinzbach Model 412 Relief Valve opens instantly to full capacity. This valve provides automatic resetting at a pre-determined pressure drop, positive seating and facilities for functional testing.

The Model 412 uses line pressure for opening and closing. The opening pressure is preset by application of a dead weight load. Opening and closing action is positive and reliable. The pre-set pressure never changes.

Kinzbach Model 412 Relief Valves are available in 2", 3", 4", 6" and 8" sizes for working pressures up to 1000 p.s.i. Write for Bulletin RV412 for full technical data.

KINZBACH TOOL CO INC

KINZBACH TOOL COMPANY, INC.

P. O. Box 277 Houston, Texas
Export Office: 74 Trinity Place, New York, N. Y.

Always Cold Water Gotkool WATER CANS AND COOLERS

GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug-fitting, large, removable top, handy, non-leaking, push-button faucet. GOTT Water Cans for handy field use. Your supply store has them, get one today!

GOTKOOL WATER COOLER Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.

GOTKOOL WATER CAN Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push - Button Faucet at slight additional cost.

KEEP PURE DRINKING WATER ALWAYS HANDY

INSIST ON THE GENUINE . . . Look for the Blue and Black Label With the Name GOTKOOL in Red.

H. P. GOTT MFG. CO.

WINFIELD, KANSAS

DRILLING CONTRACTORS

Specify STRATOFLEX

★ DETACHABLE HOSE FITTINGS

★ FLEXIBLE HOSE ASSEMBLIES

STRATOFLEX Hose Fittings and Hose Assemblies are designed to give dependable service and maximum performance. Cost-minded operators in the industry recommend STRATOFLEX! Whatever your requirements in flexible hose assemblies and detachable reusable hose fittings or elbow hose fittings — specify STRATOFLEX!

★ DEPENDABLE SERVICE

★ QUALITY PRODUCTS

WRITE FOR COMPLETE INFORMATION

STRATOFLEX

STRATOFLEX, Inc. FORT WORTH, TEXAS
P. O. BOX 10398

BRANCHES:
ATLANTA - CHICAGO - DAYTON - HOUSTON
KANSAS CITY - LOS ANGELES - MINNEAPOLIS
NEW YORK - TULSA
In Canada:
STRATOFLEX OF CANADA, Inc.,
Toronto 18, Ontario

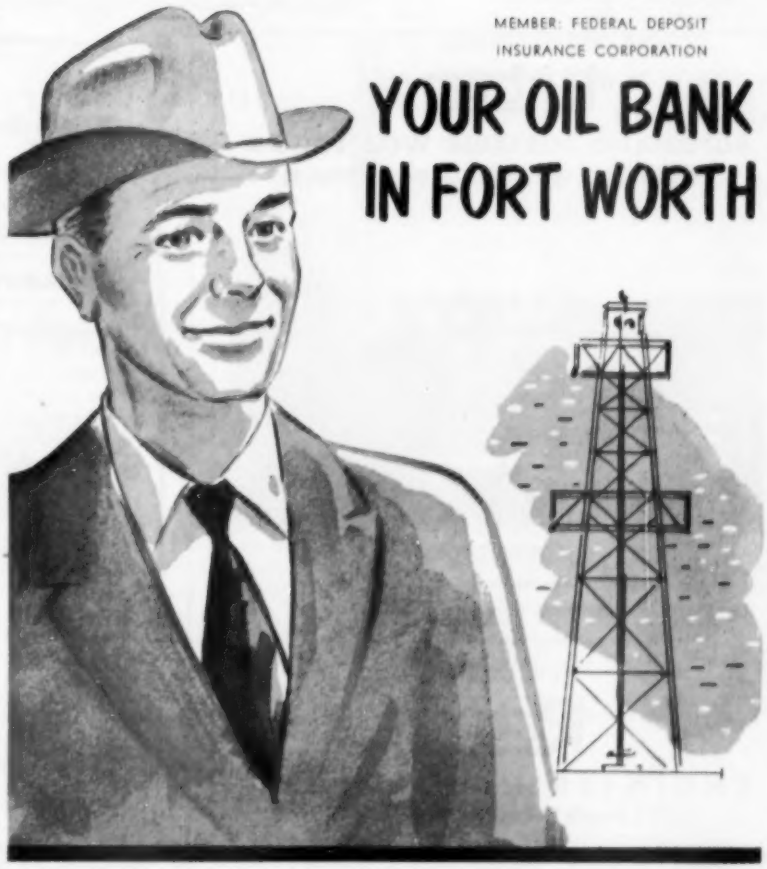
"I've found the Fort Worth National Bank's Oil Loan Division is staffed with petroleum specialists who are well qualified to understand my problems. The Fort Worth National always gives me the kind of service I like in connection with oil loan matters. That's why I say . . .

for my money...it's

The FORT WORTH NATIONAL Bank

MEMBER: FEDERAL DEPOSIT INSURANCE CORPORATION

YOUR OIL BANK IN FORT WORTH



Shown above, at the world's deepest well, is L.W. Potter and one of his radio-controlled Thompson Unitized Vacuum Tanks which hauled and cleaned up all fluids used on the site.

- ☐ Transfer rotary mud
- ☐ Remove brine
- ☐ Clean Tanks
- ☐ Transfer acid, acid sludge, caustics
- ☐ Drain sumps
- ☐ Oil roads
- ☐ Clean spills, leaks
- ☐ Haul slush and water

SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U.S. PATENT NO. 2522077

Dependable
THOMPSON
unitized
VACUUM TANKS

Here's what L. W. Potter, vacuum-service operator of Kern County says: "Every driller wants dependable crews and equipment. That's why we're proud to have been chosen to handle all the drilling mud and liquids in the record depth achievement at Paloma Field, California. It took 668 days to reach 20,522 feet, and our fleet of Thompson Unitized Vacuum Tanks never missed an assignment!"

Thompson UVT are complete, independent units, rugged-built to handle any liquid or semi-solid. Fast, Cheap, Dependable!

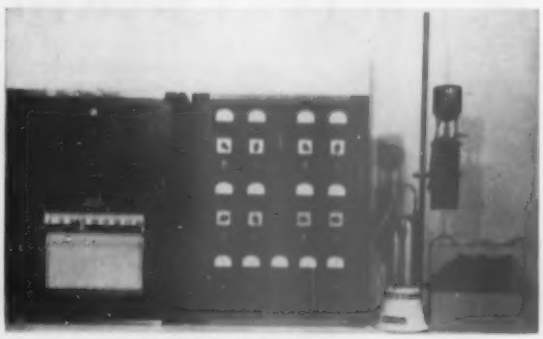
Tank capacities range from 20-100 bbl., skid, truck, semi-trailer or trailer-mounted. Cost is about what you'd expect to pay for a good new car.

THOMPSON TANK and MANUFACTURING CO. Inc.
2019 EAST WARDLOW RD. LONG BEACH 7, CALIFORNIA

Write today for complete specifications.

Rotary's

AUTOMATIC PORTABLE WELL LOGGER OPERATED BY YOUR PERSONNEL



ADVANTAGES

- ★ Low Cost (Rental only)
- ★ Automatically Recorded Gas from Mud
- ★ Automatically Recorded Drilling Rate
- ★ Clock Spring Driven Chart Recorder

Rotary
ENGINEERING COMPANY
701 South Pecos, Midland, Texas

The bank that's "oil-minded" from the board of directors right down the line.

FIRST NATIONAL BANK

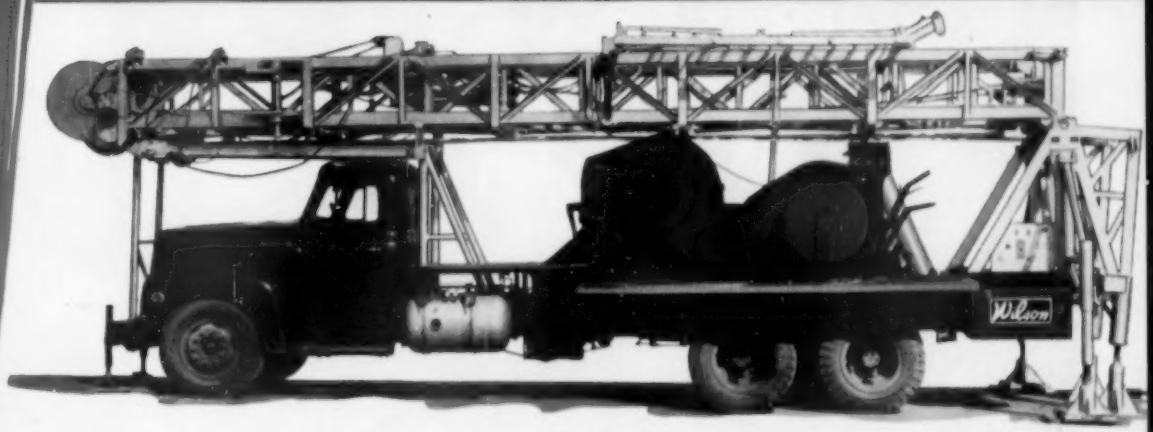
BUILT ON SERVICE 1st SINCE 1866
in Houston

MEMBER: F. D. I. C.

When it comes to OIL WELL SERVICING—

"RED IRON" ELIMINATES RED INK

BE MODERN-BUY WILSON!



Super "38" Double Drum Winch—Power Take-off mounted—with Super 65 foot Mast

THE *NEW* WILSON HEAVY DUTY TRUCK POWER TAKE-OFF

Designed especially for use on large trucks to carry full engine power to Oil Well Servicing Winches, *this "PTO' is the finest of its kind.*

Mounted directly in the drive shaft system of the truck, it turns the drive at a right angle and reduces the speed by one half, in a spiral bevel gear drive that is perfectly noiseless. A multiple width roller chain drive then transmits the power upward to a point above the truck frame. Here an extension drive shaft, equipped with gear-type clutch, carries the power outward to an oil bath chain drive which then carries the power to the winch countershaft. A gear clutch is provided in the main drive shaft to disengage the truck wheels when desired. All parts are enclosed and run in oil bath.

All drive system parts are extra heavy, heat-treated alloy steel, and run on extra large precision anti-friciton bearings. The case is welded heavy plate steel with a three-point suspension in the truck frame. This Heavy Duty PTO weighs about 1200 pounds complete but will save several thousand pounds of extra engine and transmission weight. It also makes possible a complete well servicing unit within legal weights, that would not be possible with separate engine and transmission or converter.

SPECIFICATIONS FOR SUPER "38" WILSON WINCH

	Main Drum	Sand Line Drum
Drum Barrel Dia. & Length	12¾" x 35"	12¾" x 35"
Brake Ring Dia. & Width	38" x 8"	31" x 8"
Flange Diameter	42"	37"
Spooling Capacity 9/16" line	13,000'	10,000'
Number of Speeds	5	5
High Speed 1st layer	1000	1800
Low Speed 1st layer	125	225

MAST SPECIFICATIONS

• Can be mounted on either truck or trailer • Built of finest "Manten" Angle Steel • Four Roller bearing sheave crown block • Unique crown assures straight block fall • Positive locking device controlled from ground • Safety Latch so mast cannot drop over four inches • Requires no additional guy lines • Hydraulic raising to vertical, lines to telescope upper section • Pipe racking platform automatically raised into position when upper section raised • Rod Basket built into mast for folding out • Meets all safety requirements • Road width of less than 8 feet • Meets highway requirements of length, width and height • Mast capacity 140,000 lbs.; hook load 4 lines.

Wilson

The FIRST NAME in OIL FIELD WINCHES

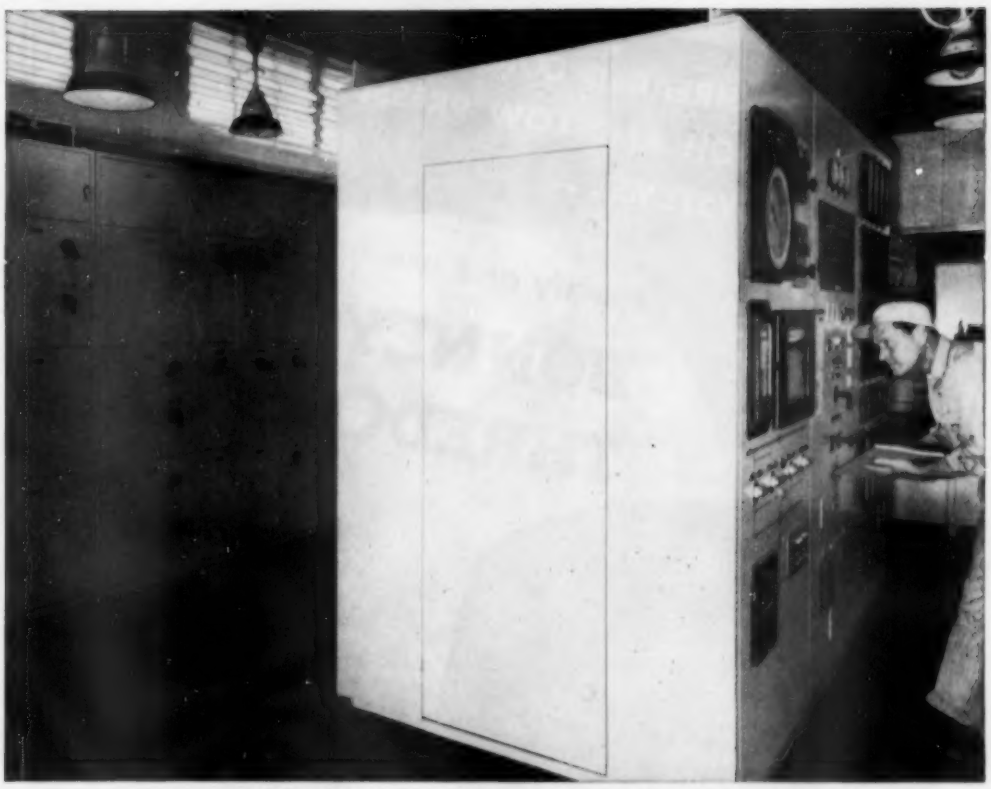
WILSON MANUFACTURING CO., INC.

The Home of RED IRON WICHITA FALLS, TEXAS

FLEXIBILITY under widely varying operating conditions is one advantage of the G-E gas turbine. It can even be operated in the desert with no cooling water required except to replace very small losses in recirculating.

G-E gas turbine helps United Gas

GREATER EFFICIENCY is provided at Napoleonville by this regenerator. Here, exhaust gases are used to heat air supply to 800 F before it enters the turbine combustion chambers to combine with the natural gas.



COMPACT, COMPLETE, CONVENIENT, the control equipment consists only of a starting and supervisory control station and an auxiliary control panel.

reach all-time day delivery peak

Pumps 510,992,000 cfd in first use of gas turbine-driven centrifugal compressor as initial main-line station

Four billion cubic feet per day of natural gas—that's the record delivery set in December, 1953 by United Gas Pipeline Co. Of this total, 510,992,000 cubic feet were pumped through United's new Napoleonville, La. station by a General Electric gas turbine.

Called in early in the planning stage, G-E engineers assisted United's engineers in the design of the main compressor building, and helped co-ordinate electric equipment with the 5700-hp gas turbine. Equipment delivery was carefully timed by G-E engineers to help complete the station on schedule. And the station has been continuously available for service since it first went on the line.

In your operation, too, a G-E gas turbine can pay big dividends.

Cuts total yearly costs. It needs fewer operators than other types of pipeline drive—only seven men are used. With few moving parts, all rotating and easily accessible, maintenance costs are low.

Provides more horsepower. It produces more horsepower in cold weather, supplying up to 25 per cent more horsepower in the winter, when demand is greatest. Rotation speed is easily changed from 2000 to 5500 rpm to meet varying load conditions. And it starts fast—in 15 minutes, automatically, at Napoleonville.

When you plan to increase gas throughput, do as United did—avail yourself early of the many specialized G-E engineering services offered through your nearest G-E Apparatus Sales representative. General Electric Company, Schenectady 5, N. Y. 061-45

Combustion Gas Turbines for the Gas Pipeline Industry—Backed by 45 years of Turbine Leadership

GENERAL ELECTRIC

FOR 90° THREADED CONNECTIONS IN ALL HIGH AND LOW PRESSURE PIPING SYSTEMS . . .

specify and use

BONNEY THREDOLETS

YOU DERIVE THE FOLLOWING ADVANTAGES:

1. **ACCELERATED FABRICATION—** with ThredOlets no coupling preparation is necessary—you obtain the most economical type of construction.

2. **NEAT AND UNIFORM APPEARANCE—** ThredOlets minimize variations caused by human element—you attain the best engineered type of construction.

3. **IMPROVED FLOW—** ThredOlets provide a funnelled inlet—you achieve better performance and better piping system design.

4. **DIMENSIONAL STANDARDIZATION—** with each ThredOlet installation, you have constant control of the critical center-of-run-pipe to face-of-outlet dimension.

The Bonney WeldOlet Welding Fittings Catalog, No. W-3, provides complete engineering and dimensional data.
Write for your free copy.

DISTRIBUTORS IN PRINCIPAL CITIES.

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

ENG. DEPT., 366 GREEN STREET, ALLENTOWN, PENNSYLVANIA

AHEAD OF THE BARGE

First there's financing by the FIRST in Dallas

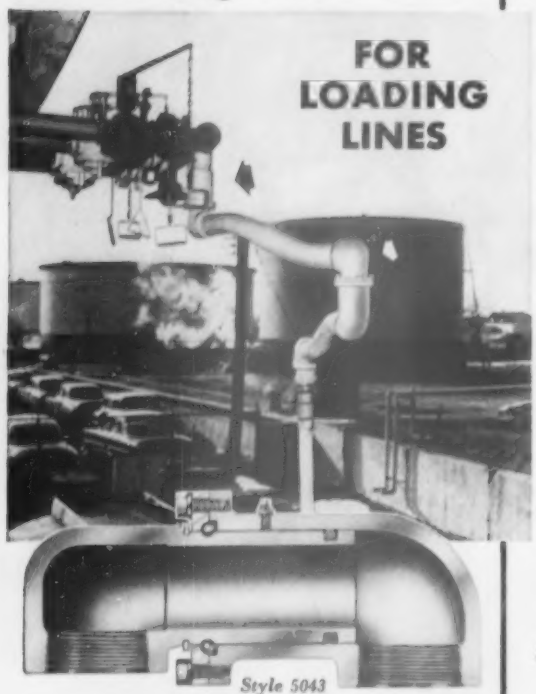
the Southwest's Pioneer Oil Bank

FIRST NATIONAL BANK IN DALLAS

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Give us an opportunity to say YES

BARCO Swing Joints



Style 5043

HERE is why users like BARCO'S new *all-steel* Swing Joints for loading and unloading gasoline, oil, lube oil, LP gas, petro-chemicals and other fluids:

BALL BEARING AND O-RING EQUIPPED—In Barco Swing Joints, the ball bearings do not fall out when joints are taken apart! Long bearing provides adequate pipe support. *Special O-ring seal eliminates frequent gasket replacement.* Seals on pressure or vacuum. Leakproof service over wide temperature range, −40°F. to 225°F.

LONG LIFE—New *"Bar-Moly"* dry lubricant process gives a permanent anti-galling, corrosive-resistant finish to moving parts. This, combined with routine lubrication, insures longest possible maintenance-free service.

EASY MAINTENANCE—Joints can be disassembled for inspection without disconnecting piping. O-rings are easily renewable in the field. Frequent greasing not required to maintain sealing.

MANY STYLES—The Barco line is complete with single swing, double swing, and counter-balance styles to meet every need. Sizes 2", 2½", 3", 4".

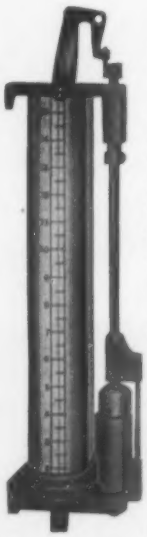
BARCO MANUFACTURING CO.
539F HOUGH STREET
Barrington, Illinois
Worldwide Sales and Service

For complete information on Barco Swing Joints, ask for a copy of Catalog 400.

W. L. WALKER CO.

SINGLE TRIPPING
WALKER OIL THIEF

Cuts Gauging Time



Take samples faster with the Walker Oil Thief. A trouble-free Single Tripping device enables the gauger to trip the thief at any depth with one quick jerk. Only one chain or rope required for lowering and tripping the thief.

Other exclusive features include: a rotating valve seat to assure proper seating; encased springs to prevent fouling; trip mechanism which accommodates any length trip rod. Sturdily built for longer service. Available in five sizes: 12, 16, 18, 24 and 36 inches. Available through all supply stores.

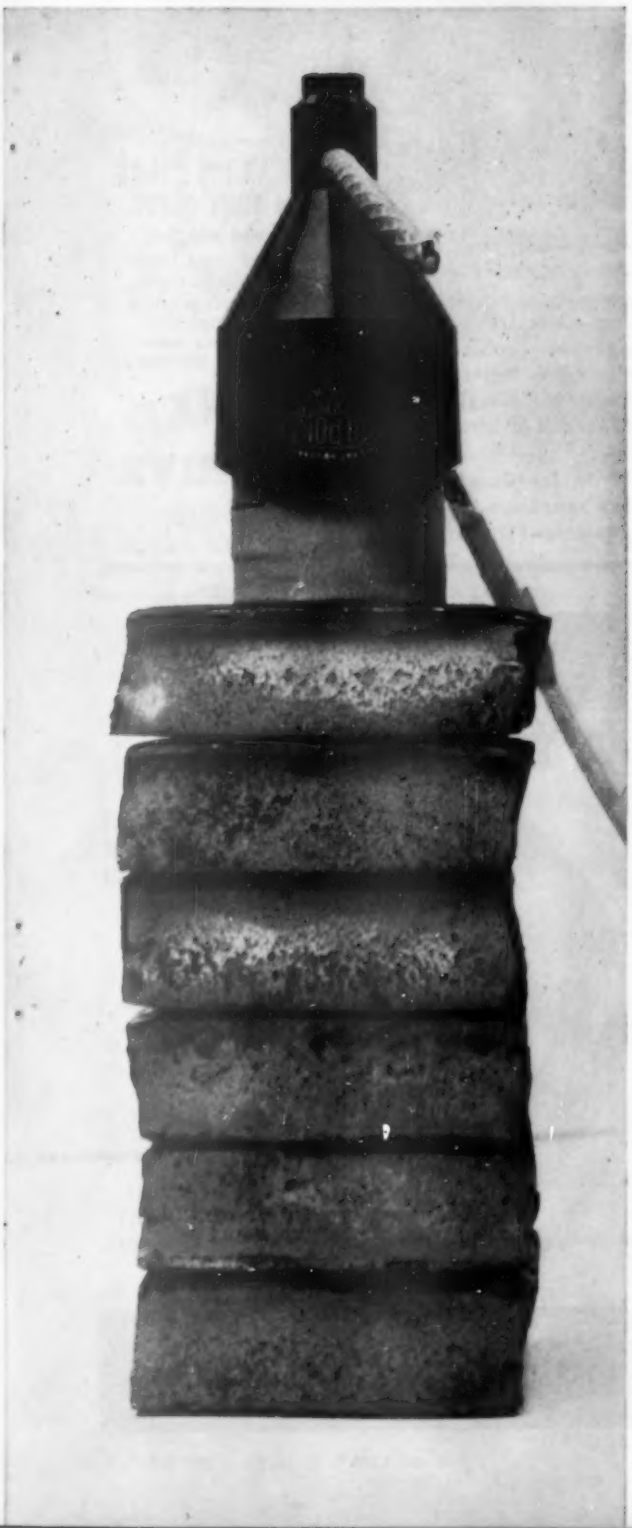
QUALITY WLW SERVICE

- CENTRIFUGE MACHINES
- GAUGING TAPES
- SAMPLE HEATERS
- STRAPPING KITS
- CARRYING CASES

Everything the gauger needs from one dependable source.

W. L. Walker Co.
Phone 2-1148
1009 South Main Tulsa, Oklahoma

Why you get consistently deeper penetration with Du Pont Jet Perforators



Standard Test Setup for Measuring Penetrating Power of Du Pont Jet Perforators.

Their design was the result of a long research program

In designing the most effective oil-well perforator yet produced, Du Pont Explosives Research chemists analyzed every factor of importance in their construction. Tests were made to determine which of several variables would give maximum penetration under conditions encountered in the field. Among these were the following six:

1. **TYPE OF EXPLOSIVE** . . . tests were conducted with various explosives to determine which would provide maximum penetration.
2. **DENSITY OF EXPLOSIVE** . . . experiments established the ideal density required to obtain maximum penetration.
3. **WEIGHT OF EXPLOSIVE CHARGE** . . . many tests determined the minimum charge consistent with maximum penetration, an important economic factor.
4. **DIAMETER OF CHARGE** . . . again, tests indicated the most effective diameter . . . giving due consideration to field conditions.
5. **ANGLE OF CONE** . . . experiments showed that practical considerations of tube diameter limited the angle of cone.
6. **METAL OF CONE** . . . another variable that was carefully checked to determine the best material for the purpose.

These are reasons why leading service organizations throughout the oil field consistently use Du Pont Jet Perforators. They insure positive penetration on any job. Be sure you specify them for your next job of perforating. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT
JET PERFORATORS
Product of Explosives Research

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Out of 90 wildcat wells drilled by Cities Service in 1953, over 67 proved to be dry. And, you may say, "Bad business." But actually these dry wells represent the "good business" sense of the entire industry.

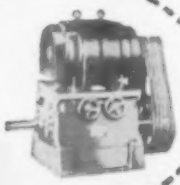
Even with all the latest scientific methods at their disposal, oil men cannot always be certain of a black-gold find beneath strange lands. What is important is that Cities Service, as well as the rest of the industry, is willing to risk huge sums on any reasonable evidence that they may find oil.

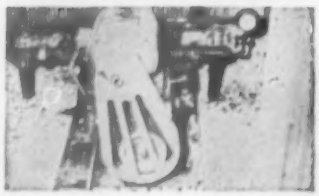
One company may decide not to drill an area, while another will say, "Let's take the risk." This is gilt-edge assurance to the nation that every possible area will be explored. It's a marvelous example of how our free enterprise, competitive system constantly influences all American business in a direction that will always benefit the consumer.

Cities Service will continue to make new oil finds to help fill the oil larders of the nation . . . known underground oil supplies are over four times what they were thirty years ago. Cities Service will continue to drill dry wells too . . . the odds are 8 to 1 against bringing in a producing discovery well. And these hundreds upon hundreds of dry wells, with the millions of dollars spent on them, will in themselves serve as a monument to the constant efforts of the American petroleum industry to keep our country strong and to keep our standard of living at the highest point the world has ever known.

CITIES SERVICE

TURNER TRANSMISSIONS
for Pipe Line Gathering





GEAR the PUMPS to YOUR NEEDS:

- 4-speed selection
- Reduce "Peak Loads" (lower power costs)
- Turner transmissions are NOT expensive. They pay for themselves in a short time.

Use smaller, inexpensive electric motors—select the pumping speed to meet your needs. Correct cold weather problems by eliminating "oil cutting". Power bill savings soon equal cost of installation.

Write for Catalog, or See Your Local Oil Field Equipment Dealer.

TURNER UNI-DRIVE Company
3495 Terrace Street Kansas City 8, Missouri

W&T Sensitive SURVEYING ALTIMETER

READABLE TO ONE FOOT

W&T Altimeter Surveying saves time and money by eliminating lines of sight.

RANGES:
—1000 to 3000 FT.
—1000 to 6000 FT.
—1000 to 15000 FT.

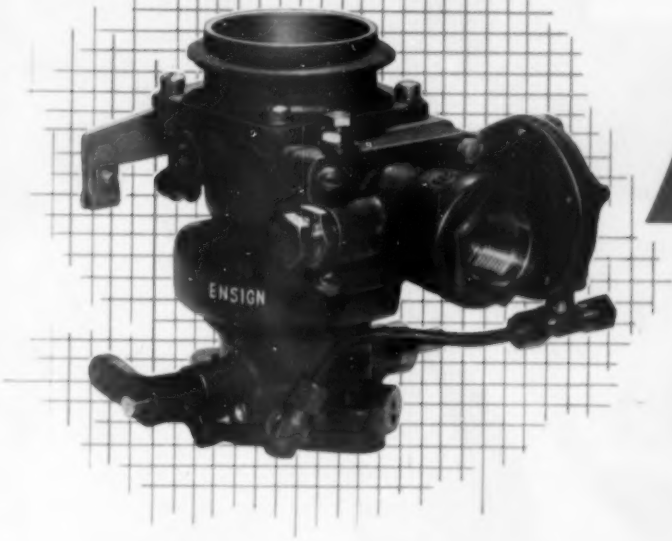
Write today for additional information. A-100

WALLACE & TIERNAN
PRECISION INSTRUMENTS AND ELECTRICAL MECHANISMS
Belleville 9, N. J.
In Canada: Wallace & Tiernan Products Ltd. • Box 54, Toronto 13

latest in gas carburetor design

by

ENSIGN

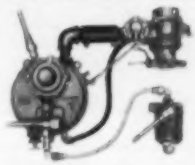


MODEL

Xg

Ensign Model "Xg" in updraft position using 90° air horn.

Ensign "Xg" carburetor and Model "B" fuel regulator.



Ensign Model "Xg" with LP-Gas vaporizer-regulating unit and liquid fuel filter.

The carburetor you see pictured above is the Ensign Model "Xg," latest development in modern gas carburetion.

An engine designer or an oilfield service man will find the "Xg" complete in every detail. Easy to install in either updraft or downdraft positions. Every adjustment is easy to make (all adjustments are shown in view above.) Built-in economizer is a mighty important feature during part throttle engine operation. The famous Ensign easy starting device, the biggest boon to gas engine dependability in many years, plus a wide selection of venturi sizes make the "Xg" the last word in gas carburetion design.

Use the Model "Xg" with Ensign Model "B" gas pressure regulator or with Ensign LP-Gas vaporizer-regulating units and you'll enjoy the finest gas engine performance possible in this day and age.

And as progress in the gas engine business unfolds itself you'll find Ensign there first with the most modern equipment—equipment already proved and field tested. Our engineers are years ahead of day to day demands; anticipating future needs, experimenting, improving and testing. For over 42 years we have specialized in carburetion to the exclusion of all else.

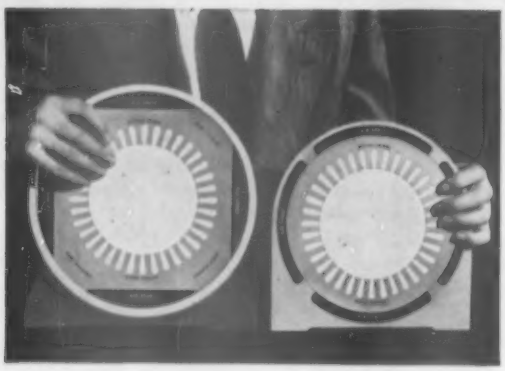
Send for Ensign Model "Xg" Bulletin #7078

ENSIGN CARBURETOR COMPANY

7010 S. ALAMEDA ST., BOX 229, HUNTINGTON PARK, CALIF.
Branch Factory, 2330 W. 58th St., Chicago 36, Illinois

Dealers and Distributors in all Principal Oil Fields.

Here are laminations from two 5-hp Life-Line motors. Note that only the inactive support corners of the original Life-Line square stator have been eliminated from the round stator of the Life-Line "A" motor.



When the stators are placed in their respective frames we see how the Life-Line "A" size reduction has been accomplished without sacrificing active magnetic steel. Excess air space has been eliminated also.

Copper, the other important active material, has not been sacrificed. The coil on the left is from an original Life-Line motor. The coil on the right is from a new Life-Line "A" motor. Both weigh the same.

Here's how more horsepower has been put in the Life-Line A motor

These demonstrations show how motor performance is determined by "active" material

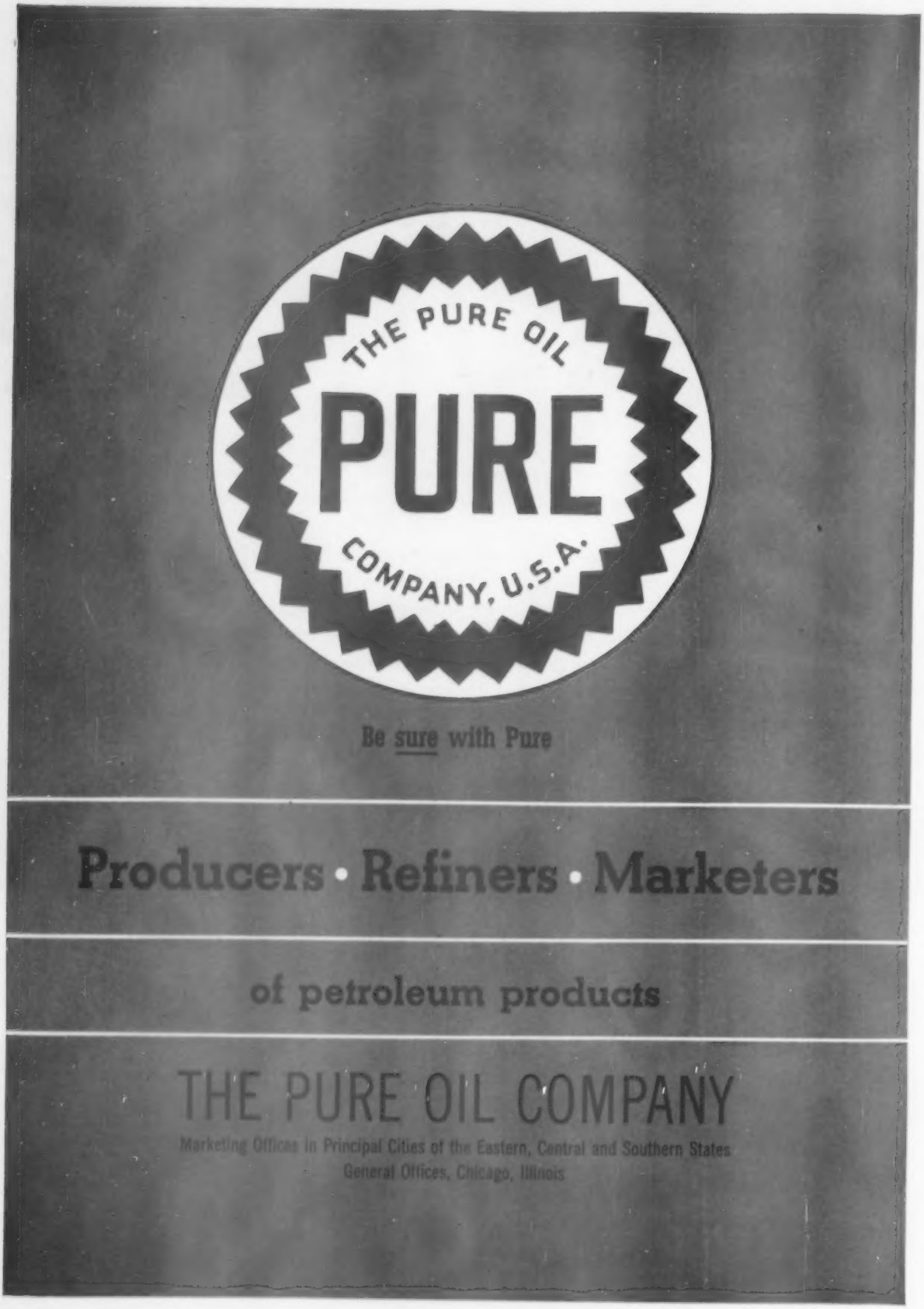
Perhaps you are a motor user who has raised the question: "How can you shrink the size of a motor and still equal or better the original performance?" Let's look inside a motor to find the answer.

The performance of any motor is dependent upon its active material—the magnetic steel and copper. Take the original Life-Line® and the new Life-Line "A" for example. The amount of magnetic steel in the stator and rotor and the copper in the coils of both Life-Line designs are the same. The reduction in size has been accomplished by eliminating inactive material and space. Thus you have a smaller motor whose basic electrical performance remains unchanged. In fact, the Life-Line design principle has been proved in service for over seven years. J-21648

For the complete story on the new Life-Line "A" motor write for your copy of Booklet B-6154. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE...IF IT'S

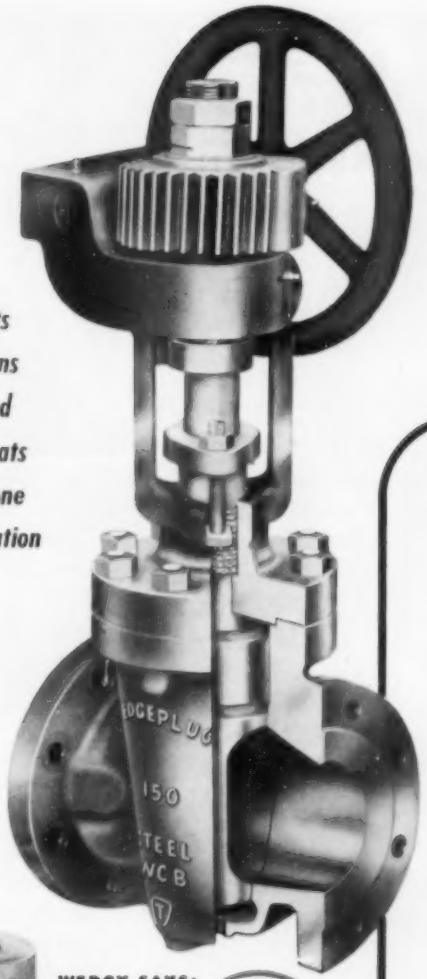
Westinghouse


THE PURE OIL
PURE
COMPANY, U.S.A.
Be sure with Pure
Producers • Refiners • Marketers
of petroleum products
THE PURE OIL COMPANY
Marketing Offices in Principal Cities of the Eastern, Central and Southern States
General Offices, Chicago, Illinois

for general service...

WEDGEPLUG
STEEL DRY PLUG VALVES

lifts turns and reseats in one operation



for special service...

WITH COATED PLUG

Wedgeplug Steel Valves, equipped with our Special-Coated Plug, are setting new standards for valve performance. The Special Coating, which is bonded to the metal, assures a tight seal, and is highly resistant to abrasion and corrosion. Ideal for handling Petroleum Oils, Liquefied Petroleum Gases, Gasoline, Kerosene, Air, Gas, Water, Vegetable Oils, Animal Fats, Alcohols, Turpentine, Acid Solutions, Alkaline Solutions, Saturated Salt Solutions, and many Solvents and Chemicals. . . . Recommended for operating temperatures between —40° and +200° F.

Available from Stock, with *Hycar-Coated Plug

MADE IN THREE TYPES: WRENCH-OPERATED
HANDWHEEL-OPERATED • GEAR-OPERATED

*Hycar is the trade-name of the Product, made by B. F. Goodrich Chemical Co., used in coating Plug.

WEDGEPLUG VALVE COMPANY, INC.
NEW ORLEANS 15, LA.

An Affiliate of

STOCKHAM VALVES & FITTINGS
GENERAL OFFICES AND PLANT • BIRMINGHAM 2, ALA.

Warehouses and Offices

PHILADELPHIA • CHICAGO • HOUSTON • DALLAS
LOS ANGELES • NEW YORK • BOSTON • ATLANTA
PITTSBURGH • ST. LOUIS • WASHINGTON • SAN FRANCISCO

Write for **WEDGEPLUG** *Catalog*

DISTRIBUTED THROUGH WHOLESALERS

REVOLUTIONARY NEW *deep water* PORTABLE DRILLING BARGE

A new economic approach to offshore drilling, Alexander's revolutionary new deep-water drilling barge is a triumph in engineering design and originality.

The huge new barge is 220′ long x 74′ wide x 63′ high, a completely integrated unit and powered by a 3200 HP diesel-electric installation.

In short, Alexander continues to set the standard in designing and constructing specialized marine equipment. Alexander service and facilities are available to your company. May we hear from you?

PICTURED TOP TO BOTTOM—
Power plant showing two Fairbanks-Morse 1600 h.p. diesel engines.
Submersible hull and large diameter steel caissons.
Two 1200-kw d.c. generators (each engine drives four generators).

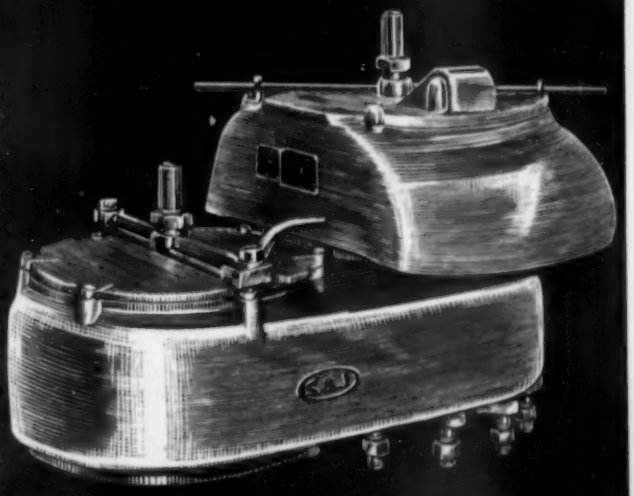
ALEXANDER Shipyard INC.

P. O. Box 8126 New Orleans, La. Phone VAlley 2408

DESIGNERS AND BUILDERS OF FINE MARINE EQUIPMENT

SAVE MORE VAPOR

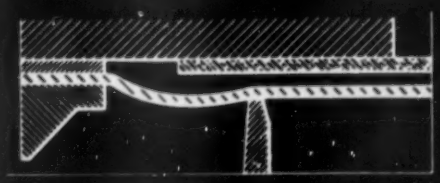
WITH NEW S&J "TITE-SEAL" BREATHER VALVE



The new Shand & Jurs Breather Valve designed for Vapor Saving Storage Tanks and Systems will reduce to the absolute minimum vapor loss under "closed" conditions. Designated by S&J Fig. ST-7575, this breather valve incorporates a unique but very practical pallet design. It utilizes a pliable, reinforced, synthetic rubber coated diaphragm which provides the tightest possible seal for both pressure and vacuum relief valves through a novel balancing action. This assures minimum vapor loss at tank pressures and vacuum relief valves through a novel balacing action. This assures minimum vapor loss at tank pressures and vacuums less than valve settings.

The diaphragm design provides a peeling action between the pallet and the seat which overcomes sticking or freezing to a very marked degree. When serious freezing hazards exist, a special diaphragm of Teflon coated fiberglass may be used. In laboratory and other tests, this has been found to require only ¼" of water beyond normal setting to break ice. The diaphragm also resists chemical action of additives and will retain its efficiency long past the time when a conventional poppet valve breather valve would require relapping of the pallet and seat.

The S&J "TITE-SEAL" Breather valve is available in 4", 6", 8" and 12" sizes. For further information write the factory or nearest branch listed below for bulletin.



Pressure Pallet illustrated at the left: In operation, tank pressure is directed through a port to the chamber outside the seat but inside the pallet periphery and produces a slight ballooning to effect a perfectly tight joint at all pressures below that for which the pressure pallet of the breather valve is set to open.

Shand and Jurs Co.

BERKELEY 10, CALIFORNIA

NEW YORK
342 Madison Ave.

CHICAGO
10409 S. Western Ave.

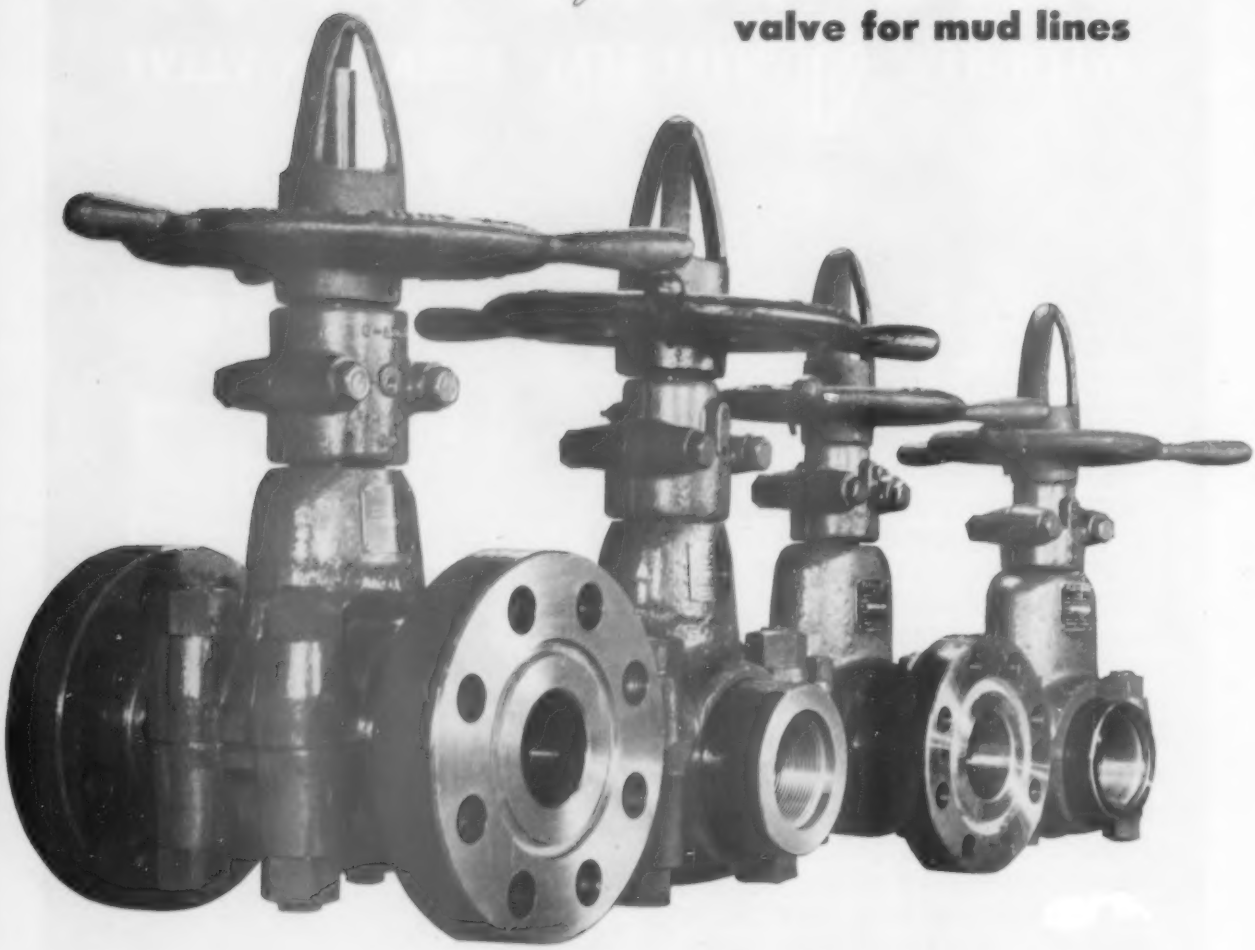
HOUSTON
M & M Bldg.

TULSA
Thompson Bldg.

LOS ANGELES
714 W. Olympic Blvd.

REPRESENTATIVES:
SEATTLE: Nebar Supply Company, 3000 Western Avenue
MONTREAL: Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialties, Ltd., 85 Richmond St., W.
VANCOUVER: P. D. McLaren & Son, Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
Whessoe, Ltd., Works: Darlington, County Durham

The *Original* and only proven valve for mud lines



The Cameron FLEX-SEAL Valve has set the standard for mud line service. Easy operation and a pressure-tight seal over a four to five times longer service life make FLEX-SEALS the best investment. Low maintenance cost—both in labor and material—are continuing dividends. When maintenance is eventually required, all components are readily accessible and may be easily replaced by the drilling crew without special tools. The unique design of the valve—two-piece body, hubs separate from the body, renewable resilient flow-way insert, accessible stem packing, etc., permits economical replacement of ***any*** part. Remember, there is only one FLEX-SEAL Valve. It is made by the people with 30 years specialized experience in developing resilient seals for high-pressure, abrasive service.

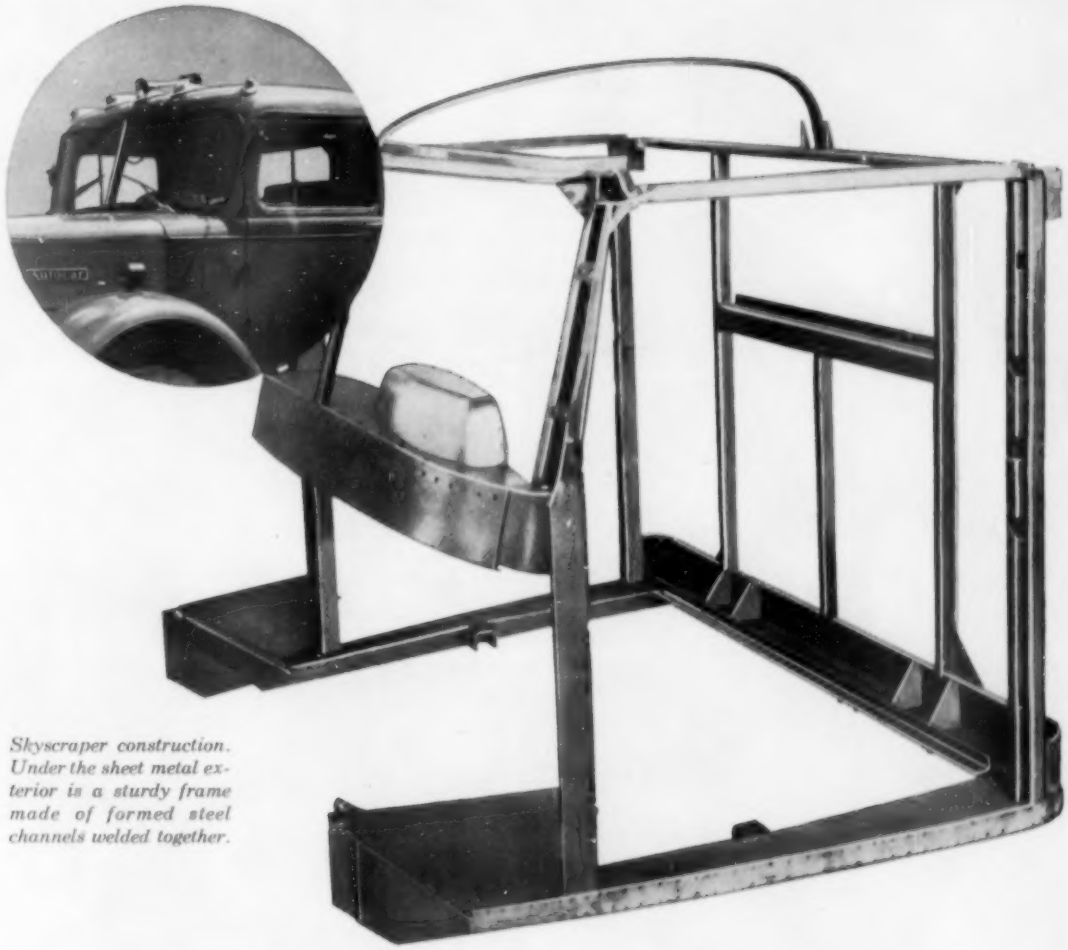
Cameron

IRON WORKS, INC.

P. O. BOX 1212, HOUSTON, TEXAS

Export Office: 7912 Empire State Bldg., New York City • In England: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London, S.W. 1, England

AUTOCAR DRIVER CAB
Safest Cab on the Road



Skyscraper construction. Under the sheet metal exterior is a sturdy frame made of formed steel channels welded together.

The Autocar Driver Cab, the Driver Sleeper Cab and the Aluminum Driver Cab are all built on the skyscraper principle—an outer skin of heavier-than-usual sheet metal over a rigid, reinforced structural frame. This construction gives the driver confidence—in himself and the vehicle.

There are other great features, too. The Autocar Driver Cab was the first to bring passenger-car comfort to truck drivers. Curved windshield for wide-angle vision; instrument panel with all dials and gauges within easy reach and view; driver's seat adjustable *five ways* to most comfortable posture.

AUTOCAR TRUCKS

Autocar Division of The White Motor Company
Ardmore, Pa.

Autocar Trucks are sold and serviced throughout the world

Mail in the coupon for detailed information about the many quality features of the Autocar Driver Cab, Driver Sleeper Cab, lightweight Aluminum Driver Cab.

Autocar Division of The White Motor Company
Ardmore, Pa.

Please send me a folder on the Autocar Driver Cabs.

Name_____

Firm name_____

Address_____

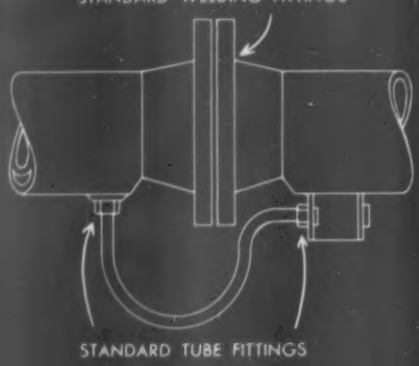
Type of operation_____

No. of trucks in fleet_____

19E

UNITRACE

Possible method of joining UNITRACE using both jumper and welding fittings.



Cross-section view of UNITRACE. Crescent-shaped section at bottom is steam line. UNITRACE is extruded as a single unit from either 3S-F or 63S-T5 Alcoa Aluminum alloys.

ALCOA'S NEW STEAM TRACED PIPE SAVES

30% OF LABOR COSTS

REDUCES MATERIAL COSTS

REDUCES INSULATION COSTS

OVER CONVENTIONAL STEAM JACKETED LINES

Here's a totally *new* product for users of steam traced piping. ALCOA's UNITRACE® *eliminates* the cost of external steam jackets or steam tracer tubes because the steam line is an integral part of the aluminum pipe!

Because of the natural corrosion-resistance of aluminum, UNITRACE is well suited for handling naval stores, molten sulphur, ammonium nitrate solutions, glacial acetic acid, fatty acids, tar, pitch and similar products normally requiring steam tracing.

UNITRACE provides greatly improved heat transfer properties . . . lends itself readily to shop fabrication of standard lengths . . . can be formed easily with tube bending tools. Pre-formed insulation will fit UNITRACE, but improved efficiency makes thermal insulation unnecessary in many cases. UNITRACE is available in 2, 3 and 4 inch standard schedule 40 pipe sizes without die charge.

For further information, call your nearest ALCOA sales office or write ALUMINUM COMPANY OF AMERICA, 904-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

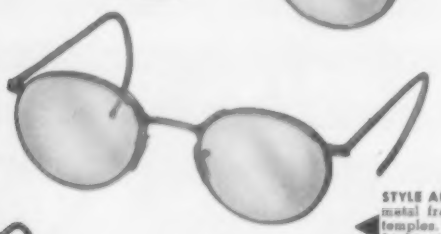
WILLSON SAFETY SPECTACLES

... Everything you want in

- PROTECTION
- COMFORT
- STYLE

STYLE WB—Distinctive bronze-color butyrate frame. Non-flammable. Toughest plastic made for spectacles. Standard cable or spatula type Hi-Line® temples. Light, sturdy, handsome. (With matching sideshields, Style WBS.)

STYLE A—Strong metal frame, on-line temples, with metal reinforcing bar or pearloid brow rest. Rocker nose pads. Exceptionally comfortable. (With sideshields, Style AS.)



STYLE AH—Single-bridge metal frame with Hi-Line® temples. Rocker nose pads. Light yet safely sturdy. (With sideshields, Style AHS.)

STYLE AV—Modern metal frame with Hi-Line® temples, metal reinforcing bar. Rocker nose pads add extra comfort. A popular style of outstanding value. (With sideshields, Style AVS.)

STYLE WK—Sturdy flesh-color butyrate frame—"keyhole" bridge. Choice of spatula or half-plastic, half-cable temples. Adjustable for perfect fit. (With sideshields, Style WKS.)

Write for Willson Spectacle Data Chart and outline of our complete program on corrective-protective eyewear.

ASK YOUR WILLSON DISTRIBUTOR to show you the Willson Sample Kit of Safety Spectacles which includes lenses, frames and sideshields available.

More than 300 Safety Products Carry This Famous Trademark

WILLSON

Established 1870

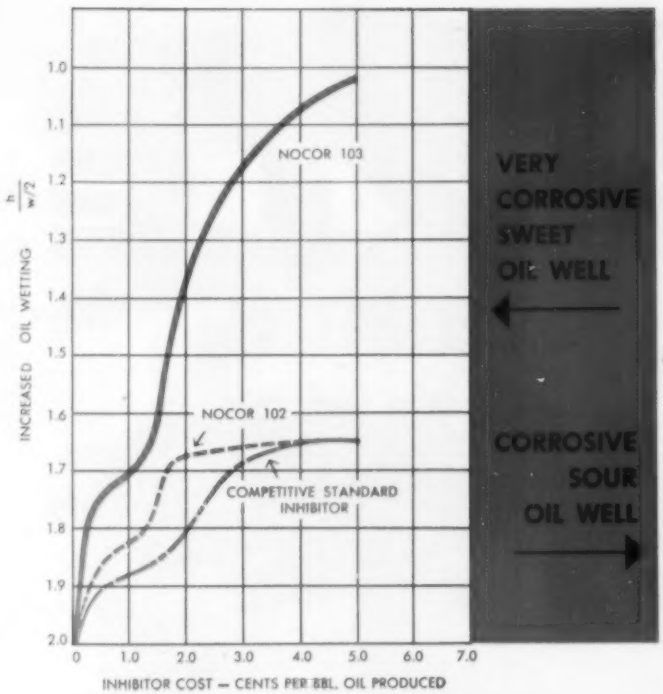
SERVICE

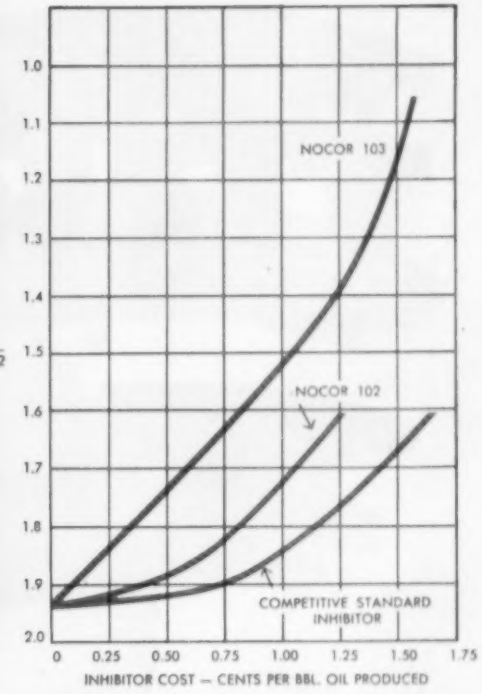
The Oil and Gas Journal's TIME SAVER Card is designed to give Journal readers One-Stop Service in securing more data from its Advertisers.

Instead of writing a letter to each of those Advertisers, remove one of the cards from the yellow page you'll find in this issue—keep it beside you as you go through this issue.

As you see an Advertisement that interests you, jot down the page number, complete it as directed and send it to us. We'll see that you get more information.

THAT'S ONE-STOP SERVICE


INCREASED OIL WETTING $\frac{h}{w/2}$
NOCOR 103
NOCOR 102
COMPETITIVE STANDARD INHIBITOR
VERY CORROSIVE SWEET OIL WELL
CORROSIVE SOUR OIL WELL
INHIBITOR COST — CENTS PER BBL. OIL PRODUCED



Corrosion research develops potent new inhibitor—

Nocor "103"

In a series of articles published by the Oil and Gas Journal early in 1953, it was shown that the two properties oil and gas well inhibitors should possess are (1) the ability to form a tenacious film on the surface to be protected and (2) to render that surface oil-wet. Both characteristics should be as great as the researcher can possibly make them.

For some time, corrosion technicians have known that certain known compounds possess the ability to form a tight film on a steel surface—providing they have access to that surface. Other molecules possess the property of rendering steel surfaces oil-wet in systems which contain both oil and brine. Unfortunately, no single compound was known which possessed both properties to a high degree. It was necessary to blend both film-forming and oil-wetting molecules into commercial inhibitors in order that the product would possess the desired properties to a satisfactory degree. It is evident that a single molecular species capable of performing both functions would possess advantages both in ability to reduce corrosion and in the economy of the finished product.

Cardinal Chemical began working toward a single molecular structure which possessed all the desired properties. Within seven months, Cardinal synthesized test-tube quantities of a compound which showed unusual promise. Four months later, Cardinal developed a means of producing the new molecule in commercial quantities. Nocor "103" was born.

In certain dynamic weight-loss tests, Nocor "103" gives good protection at 25 p.p.m., while Nocor "102" (long since proven in the field to be a superior product) shows no inhibition at 50 p.p.m., and is mediocre at 75 p.p.m.

RENDERS STEEL OIL WET

The most unusual performance of Nocor "103", however, lies in its ability to render surfaces oil-wet. This is in keeping with a prediction in the articles mentioned above that the most significant new improvement in corrosion inhibitors would result from enhanced wetting properties. Figures 1 and 2 emphasize the exceptional performance of the new product. The measurements were made upon air-free samples of crude oil and brine from unusually corrosive wells. Oil-wetting ability is expressed by the Drop Shape Ratio method (see J. Phys. Chem., 40, 159, [1936] for a discussion of the method). There are several reasons why this method may not correlate with dynamic field conditions, but one thing is certain: field conditions, if different from laboratory conditions, will have an adverse effect upon oil-wetting. Therefore, a product which cannot pass this test will be expected to exhibit poor wetting in the field. Fortunately, a great amount of work has been done with the Drop Shape Ratio. It is proved that—especially in sweet oil wells—use of sufficient concentrations of wetting agents to reduce a drop shape ratio to a value of 1.7 or below will control corrosion. This holds true even if the wetting agent possesses no ability whatever to form a lingering tenacious film (Corrosion, 10 No. 3, 106-109, [March, 1954]).

FIGURES SHOW NEW NOCOR SUPERIOR

Data in Figure 1 were measured on fluids from a problem well treated unsuccessfully with both Nocor "102" and a standard oil well inhibitor. The failure of these inhibitors possibly may lie in their inability to render the steel surfaces oil-wet when small amounts are used. Nocor "103" can afford a high degree of protection in this well by virtue of its oil-wetting properties alone. In addition it simultaneously forms a protective film which further multiplies the effectiveness several times over again.

Limited field tests to date show that Nocor "103" used in the same concentrations as Nocor "102" will reduce residual corrosion rates to as little as 1/10 that permitted by Nocor "102".

OTHER ADVANTAGES

Other properties of Nocor "103": its pleasant odor, non-toxicity, fluidity in cold weather, sufficient dispersability in brine to permit complete flushing to bottom in high water: oil ratio wells.

Price $1.50 per gallon, f.o.b., Odessa, Texas.

If corrosion is a problem in the production of your oil wells, switch to the new Nocor "103"—another product of Cardinal's unending research to make good things better.

New literature reporting fully on the new Nocor "103" is being made ready now for the presses, and will be available soon.

CARDINAL CHEMICAL

INCORPORATED

HOME OFFICE

P. O. Box 2049, Odessa, Texas

the new way to remove sulfur

SHELL HYDRODESULFURIZATION PROCESS

With by-product catalytic reformer hydrogen available, you should look into this new Shell **Trickle Flow** Process.

Trickle Flow operation makes this process unique and economically attractive for hydrofining distillates because of:

- **Very low hydrogen recycle**
- **Sustained catalyst activity**
- **High liquid yields**
- **No need for re-running products**

The Shell **Trickle Flow** Process employs a rugged, low-cost sulf-active catalyst.

A large commercial plant, using Shell **Trickle Flow** Process, is now approaching completion and several others are being planned.

We invite your inquiries.

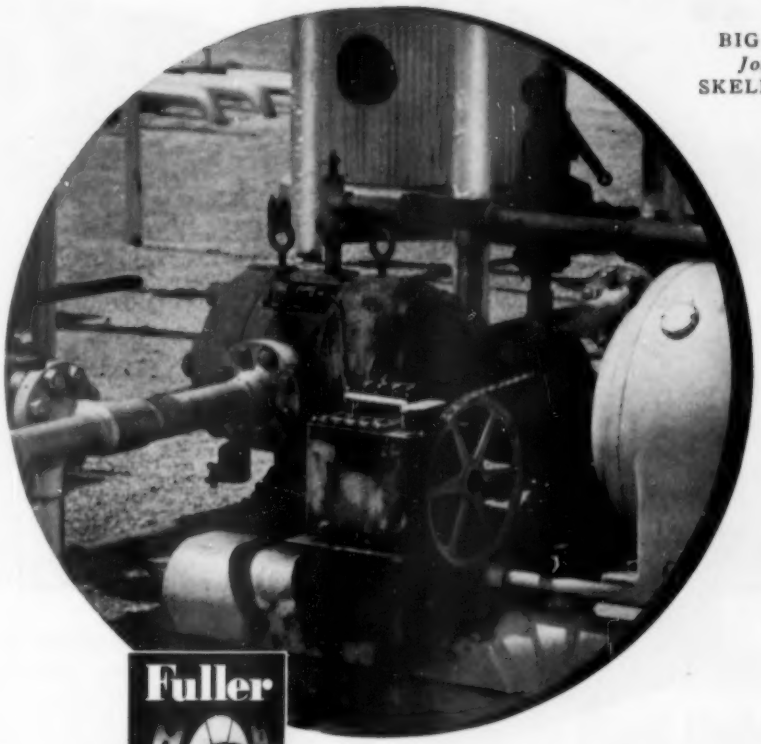
SHELL

SHELL DEVELOPMENT COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK

REEF FIELDS *Gasoline* CORP.,

BIG SPRING, TEXAS
Jointly owned with
SKELLY OIL COMPANY



USES Fuller *ROTARY COMPRESSORS*

FOR SURE, PULSE-FREE SERVICE

Fuller Rotary Compressors are used wherever reliability and low maintenance are important.

Illustrated is a Fuller Rotary Single-stage propane-vapor booster at the Reef Fields Gasoline Corporation, Big Spring, Texas. This machine has a capacity of 55 c.f.m., referred to intake condition of 225-lb. gage (895 free c.f.m.) compressing to 250-lb. gage discharge, operating at 1160 r.p.m.

Fuller Rotary Compressors in the refinery for general plant air, purging gas, refrigeration in alkalization units, and handling butane-butylene, as well as in the field for pressure boosting and gas gathering, have proved their worth, as is evidenced by the many machines in daily use in practically every oil-producing section of the country.

Simplicity of construction has proved to be one of the important factors . . . the only moving parts being the rotor, bearings, and blades. No valves to leak, no seats to grind, results in maintained capacity for the life of the machine. A simplified direct drive eliminates power transmission losses.

For further information, write to Fuller Company, Catasauqua, Pennsylvania.

C-247
2323

Fuller *Pioneers of high-efficiency rotary compressors*

R/M SUPER-POWER V-BELTS...

Today's bigger rigs, higher rig floors and heavier power loads demand greater strength and more power delivery than ever in V-belt drives. R/M Super-Power V-Belts have that extra strength and power. With R/M Super-Power V-Belts you get 40% greater horsepower capacity than with regular V-belts. A combination of new synthetic fibers in the V-belt strength member provides greater resistance to heavy shock loads . . . virtually eliminates belt stretch and matching problems. R/M Super-Power construction, plus straight side-walls, means better belt tensioning and grip, less slip . . . more power delivered on the drive—*extra* power for your drilling and pumping operations. In addition, R/M Super-Power V-Belts are oil-proof, non-spark and heat resistant.

These features add up to "MORE USE PER DOLLAR" when you specify R/M Super-Power V-Belts for your drilling rigs and pumping units. Write for a copy of Bulletin 6628. And inquire also about other R/M V-Belt constructions, flat belts and rubber hose specially engineered by Manhattan for use in the oil field.

RM

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

REFINERY PROCESS NEWS

PUBLISHED BY REFINERY PROCESS DIVISION, THE M. W. KELLOGG COMPANY MAY 1954

Four K. I. C. Projects Now Underway Involve Over $200 Million

Investment expenditures totaling the equivalent of over $200 million will be made by Kellogg's clients for just four of the many projects currently under construction by Kellogg International Corporation, Kellogg's wholly owned subsidiary for contracts outside the Americas. Already well along in construction, the projects include a vast gasoline-from-coal synthesis plant in South Africa; a complete catalytic refinery in Australia large enough to supply almost half that country's petroleum needs; a completely integrated, thermal combination refinery in Baghdad for the Royal Government of Iraq; and plants for producing phthalic anhydride and olefins for Montecatini, well known Italian chemical producer.

First Use of Synthol Process

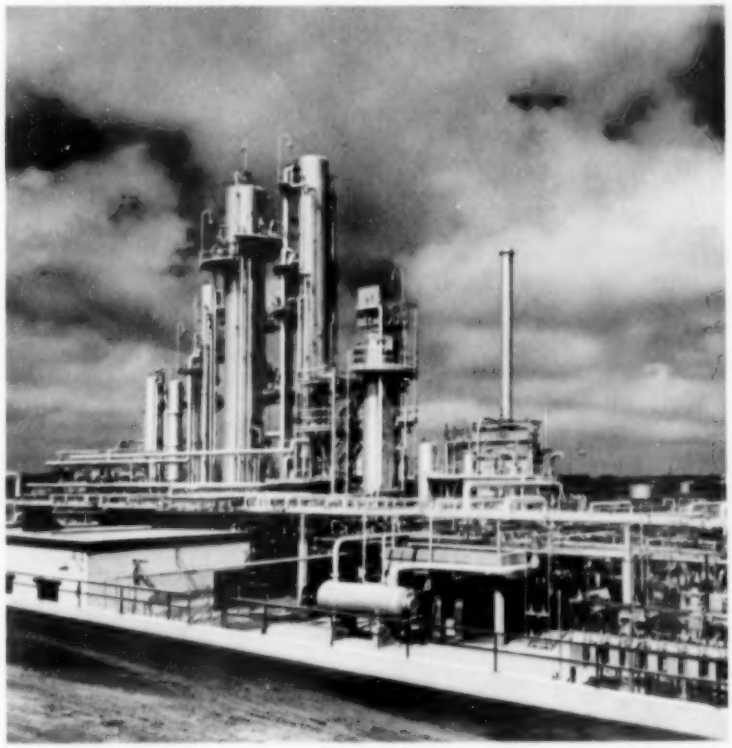
The South African plant, under construction for SASOL (South African Coal, Oil, and Gas Corporation Ltd.) is expected to go on stream by the end of the year. When completed, it will produce gasoline, fuel oil, and a long list of by-product chemicals, using as starting material coal from virgin deposits near the plant site.

Kellogg's Synthol process, a unique step for catalytically reacting gases from the controlled combustion of coal, constitutes the heart of the entire operation. Additional gasoline is produced in subsequent steps when light hydrocarbons formed in the Synthol process are polymerized. The water soluble fractions—also produced in the synthesis step—are separated into their chemical components.

Refineries in Remote Areas

The two petroleum refineries are scheduled for completion in 1955. They underscore the tremendous undertakings involved in building self-contained industries in relatively unindustrialized parts of the world. For example, in addition to the actual 70,000 BPD refinery, the Australian project includes a

(continued on following page)



New Solvent Lube Plant Underscores the Efficiency and Quality Production of Improved Propane and Phenol Treating

Still on its initial run after 11 months on-stream, one of the world's most modern solvent extraction lube oil plants—designed and built by Kellogg for a Midwest refiner—has turned in an impressive operating record. High on the list of the plant's achievements are increased yields of premium products and an ability to maintain quality while processing feed stocks of lower-than-design specification.

Propane deasphalting and phenol extraction units are the heart of the plant. Both processes incorporate a number of design changes developed as a result of Kellogg's pilot-plant operations. For example, trays in the phenol extraction tower are of a special design which minimizes entrainment or "re-cycling." Because the two liquid phases settle or "de-mix" more effectively, this provides in effect an increase in the number of theoretical extraction stages. Still another design feature is incorporated in the phenol extraction tower to give a cleaner, sharper, more easily controlled interface between the liquids—a decided improvement over conventional versions of gravity extraction towers.

Some indication of the efficiency of the plant can be seen in some of the results obtained during test operations. From a reduced crude with 7.5 Conradson carbon, the propane deasphalter produced a yield of 75.6% deasphalted oil with 1.82 Conradson carbon. In the phenol extraction unit, a yield of 63.9% of

(continued on following page)

REFINERY PROCESS NEWS

CONTINUED FROM PRECEDING PAGE

(continued from previous page)

New Lube Plant...

95.2 VI oil was obtained from a deasphalted oil charge, and a yield of 62.5% of 95.1 VI oil was produced from an 80 neutral feed stock.

The impressive performance of modernized propane deasphalting and phenol treating witnessed to date in the new plant is in logical sequence with Kellogg's earlier developments in both of these techniques. The company was the originator of "Tower Deasphalting"—now well known to all refiners as the process that radically changed the significance of the term "select crude." As a result of this development, asphalt content is no longer a measure of the potentiality of any crude for processing into premium lube oils.

A continuous low temperature operation that precludes cracking, tower deasphalting is now the accepted method for completely removing the asphalt from any crude in a single, economical step—and further—it uses as solvent a product the refiner already has at hand.

Counter-current extraction with phenol, an equally pace-setting development in lube processing, has become a standard method for improving the viscosity index and stability of all types of residuals as well as distillate oils. The ability of phenol to remove naphthenic acids thoroughly and to handle stocks of high sulfur content satisfactorily (without loss of solvent through chemical reaction) is one of its most important advantages.

Some Facts About Delayed Coking

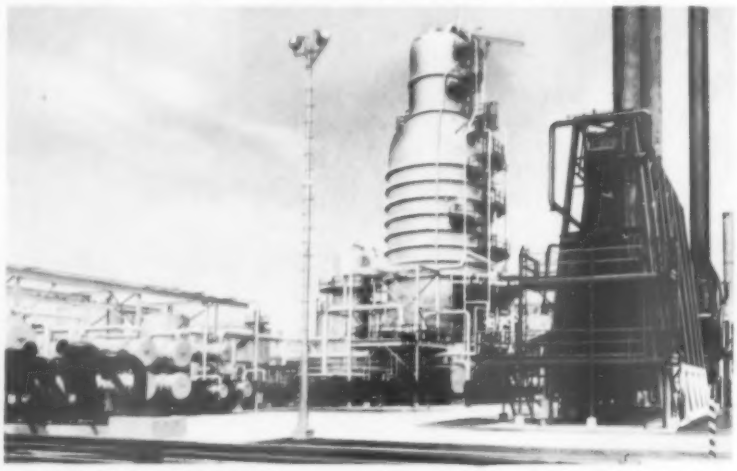
Did you know... that Kellogg has designed and built 63 per cent of the world's Delayed Coking capacity?

... that the world's largest Coker, built by Kellogg for a California refiner, has a throughput of 26,000 BDP, producing as by-product 1100 tons of coke per day?

... that process designs for Delayed Cokers have improved to such an extent that on-stream times of over a year may be readily obtained.

World's Largest Vacuum Flasher...

Above is shown the tower and furnaces for what will shortly be the largest Vacuum Flashing unit in the world—beating out by a slight margin the present title holder, shown below. Both of these Kellogg-built vacuum flashers are located at refineries of the Standard Oil Company of California, the new one at El Segundo, the other at Richmond.



(continued from previous page)

Over $200 Million...

1,700-foot pre-cast concrete jetty to accommodate ocean going tankers and two 17 mile pipe lines.

The two Montecatini projects are both unusual. The phthalic anhydride plant employs the Fluid catalytic process; the olefin plant produces ethylene and other olefins by the pyrolysis of gas oil and naphtha.

The South African and Australian projects, together with the 20,000 BPD refinery at Baghdad and the chemical plants in Italy, represent only a cross section of K. I. C.'s far-flung operations. From its London offices, the company supervises over-all construction, procurement, and labor recruitment for these as well as a score of other petroleum and chemical plants now building overseas.

For further information, technical data, etc., on any refining process, write

REFINERY PROCESS DIVISION

THE M. W. KELLOGG COMPANY

225 Broadway, New York 7, N. Y.

Also Jersey City,
Los Angeles, Tulsa, Houston, Toronto,
London and Paris

KELLOGG PULLMAN

AIRCO HELMETS: A complete line of helmets and face shields in a wide variety of styles and types. In any kind of service, these Airco products provide the greatest possible operator safety and comfort.

AIRCO HOLDERS: Famous Jackson jaw-type and Martin Wells screw-type holders. Nineteen Jackson models, from 200 to 500 amperes. Six Martin Wells, including the Heavy Duty Model 6S — the only holder on the market that will handle 700 amperes!

AIRCO GLOVES: The same quality that makes other Airco accessories the best value you can buy extends to welders' gloves and leather sleeves.

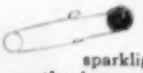
AIRCO CABLE AND CONNECTIONS: Unrivalled dependability, long life and flexibility. Sizes from 4 to 4/0, for wide range of amperages at varying distances from welding machine. Make sure of good connections with Airco ground clamps, cable splicers, Quik-Trik cable connectors and cable lugs.

RELY on AIRCO quality in both fields

. . . And soapstones, tip cleaners, clamps, circle cutting attachments, carrying cases, carbon pencils, carbon torches, graphite electrodes, chipping hammers, brushes . . . you name it — Airco has it at low prices. Call your Airco dealer or write us directly for your copy of Catalog 13, "Airco Welding Accessories," and complete price list.

AIRCO GOGGLES: for gas welding or cutting. Precision made, they afford excellent ventilation with maximum eye protection. All types exceed National Bureau of Standards requirements.

AIRCO CYLINDER TRUCKS: Make your welding and cutting outfit easily portable with an Airco two-wheel hand truck. Strong, rigid, welded steel frame; broad steel platform. Five models offer wheel sizes and styles for every type of surface.



AIRCO SPARKLIGHTERS: Save time and trouble with the standard Airco sparklighter and its replaceable round file, or the heavy-duty Airco Tri-Flint model, which carries three flints in a rotating holder.

AIRCO TWIN-HOSE: Two lines of hose moulded into a single, light, flexible unit. Close, tight braid permits thicker rubber cover for greater wear resistance.

AIR REDUCTION MAGNOLIA COMPANY

A Division of Air Reduction Company, Incorporated

P.O. Box 319, Houston 1, Texas

Beaumont • Corpus Christi • Dallas • El Paso • Fort Worth • Hobbs
Oklahoma City • San Antonio • Shreveport • Tulsa • Wichita Falls

AN AIR REDUCTION PRODUCT

at the frontiers of progress you'll find

Southwestern Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

HOSPITALITY CANNOT BE "MASS PRODUCED"

Devotion to service and pride in management characterize these independently owned hotels, creating for each traveler a truly distinctive and enjoyable visit.

WARNER REPRESENTED

Distinguished Hotels

Nationally Represented by

ROBERT F. WARNER, INC.

NEW YORK
588 Fifth Avenue,
JUdson 6-5500

CHICAGO
77 W. Washington Street,
RAndolph 6-0625

BOSTON
73 Tremont Street,
LAfayette 3-4497

WASHINGTON
Investment Building,
REpublic 7-2642

...offices in Los Angeles, San Francisco and Seattle— Glen W. Fawcett Associates

NOT A CHAIN . . .
Individually Owned

Call the hotel nearest you for free teletype reservation service.

NEW YORK

Hotel Commodore

CHICAGO

The Drake

BALTIMORE

Lord Baltimore

CINCINNATI

Netherland Plaza & Terrace Plaza

PITTSBURGH

Carlton House

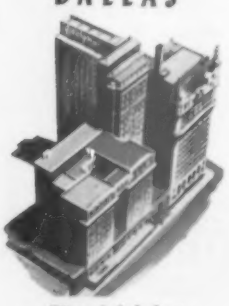
ATLANTIC CITY

Chalfonte-Haddon Hall

ST. LOUIS

Chase & Park Plaza

DALLAS



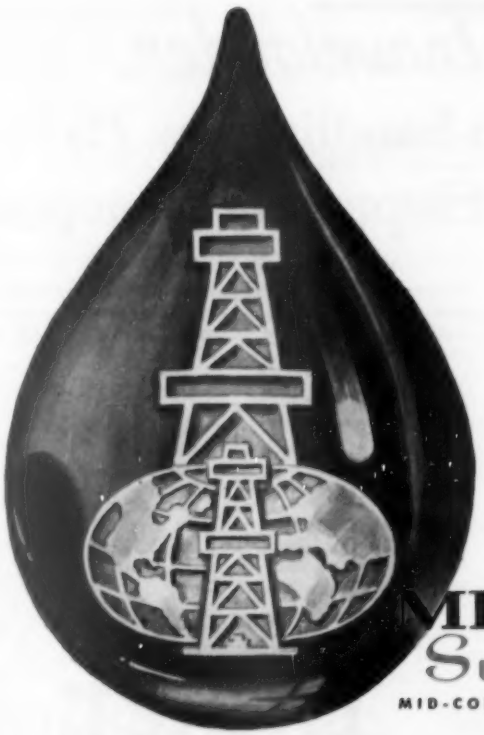
The Adolphus

...also— **BOSTON** *—the Parker House,* **LOS ANGELES** *—The Biltmore,* **SAN FRANCISCO** *— The Mark Hopkins,* **SEATTLE** *— The Olympic.*

THIS SYMBOL OF THE OIL INDUSTRY

is our

SYMBOL OF SERVICE



A drop of oil is the symbol of the oil industry the world over. The famous world and derrick emblem of Mid-Continent Supply Co. is also a symbol of the oil industry — a symbol of sure service and sure supply — Wherever There Is Oil.

MID-CONTINENT
Supply Company
MID-CONTINENT BLDG. • FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Traveloader®

cuts "man-handling" by 75% for Superior Separator Company

Superior Separator Company of Hopkins, Minnesota, manufacturer of nationally-known *"Farmhand"* handling products for agriculture, learned how non-productive manpower could be released for profit-making work. TRAVELOADER and two men are doing more work than was formerly accomplished with eight men and three machines! Superior Separator is one of the country's largest users of seamless tubing, and large stocks of tubing and other raw materials are efficiently handled from storage yard to plant with the TRAVELOADER.

Before TRAVELOADER, a mobile crane, a fork truck, and trailer wagons plus a labor force of eight men, brought materials from storage yard to loading dock for delivery to production departments. Now, only two men and one TRAVELOADER do the whole job . . . and do it better!

Not only has TRAVELOADER been used for handling raw materials . . . tubing, structural steel, and plywood . . . but, for the handling of delicate welding jigs which are stored outside when not in use. The previous method of handling caused damage to welding jigs and other materials . . . a costly unnecessary expense has been eliminated because TRAVELOADER lifts, carries, and unloads gently and securely.

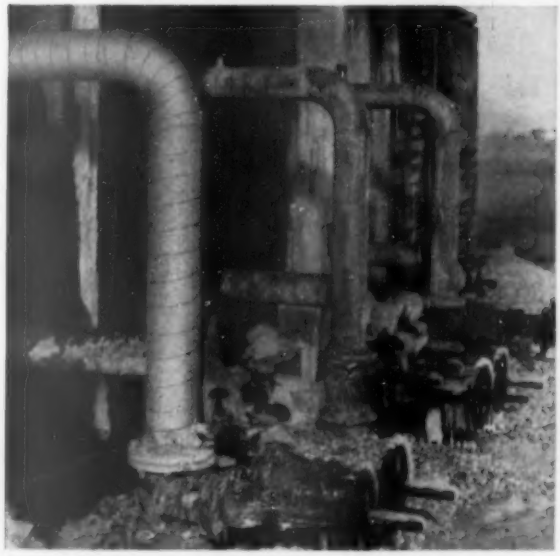
"TRAVELOADER is the finest single piece of materials handling equipment I have ever worked with" says Mr. Russell Wolf, Factory Manager at Superior. And he knows materials handling equipment because his firm builds these products for farm use.

Write for Bulletin 1360. It completely describes the remarkable TRAVELOADER that carries like a straddle truck, delivers like a road truck, and stacks like a fork truck. The Baker-Raulang Company, 1247 West 80th Street, Cleveland 2, Ohio.

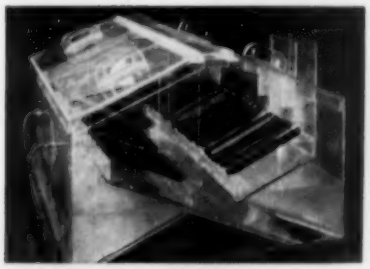
Baker.
industrial trucks

New corrosion protection

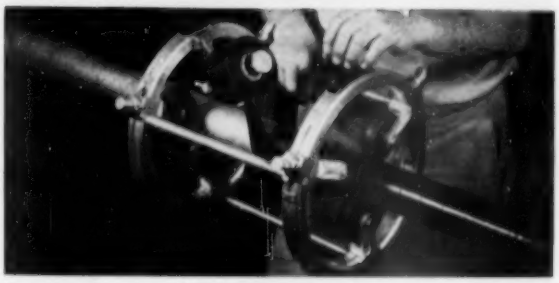
comes packaged from the factory



On Michigan-Wisconsin Pipe Line Co. cooling tower, where the temperature is freezing outside and 130° F. inside, the *Polyken* protected pipe on left has outlasted pipes on right 3 to 1 with still no sign of deterioration.



This specially designed spray chamber in the *Polyken* laboratories speeds up corrosion — shows in weeks how *Polyken* will withstand corrosion for years.



Quickly and economically applied. *Polyken* tapes are easily applied either by hand or portable tapester machine as shown here. Tapester wraps, splices, and laps uniformly, and quickly—up to 30 ft. per minute even by inexperienced men.

Controlled manufacture of POLYKEN plastic tape helps cut corrosion damage

Corrosion damage costs the U. S. billions, your company hundreds of thousands each year.

Tape—a new Polyethylene plastic tape made by *Polyken*—could be the big weapon in your fight against corrosion to save your company money.

Polyken Polyethylene tape—a tough plastic adhesive film—is manufactured in the factory under controlled conditions, not out on the job.

Its high resistance to galvanic, water and chemical corrosion never varies.

Its easy-to-handle tape form makes it simple and clean to apply. Requires no heat, liquids, solvents or thinners.

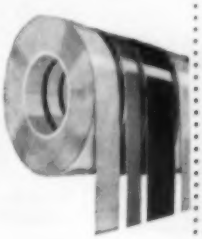
If you have a serious corrosion problem involving a curved surface, cylinder, pipe or tube, give *Polyken* a test.

Mail coupon for FREE samples and complete information.

Polyken®

PROTECTIVE COATINGS

POLYKEN PRODUCTS DEPARTMENT OF THE KENDALL COMPANY



Polyken, Dept. OG-E
222 West Adams St., Chicago 6, Illinois

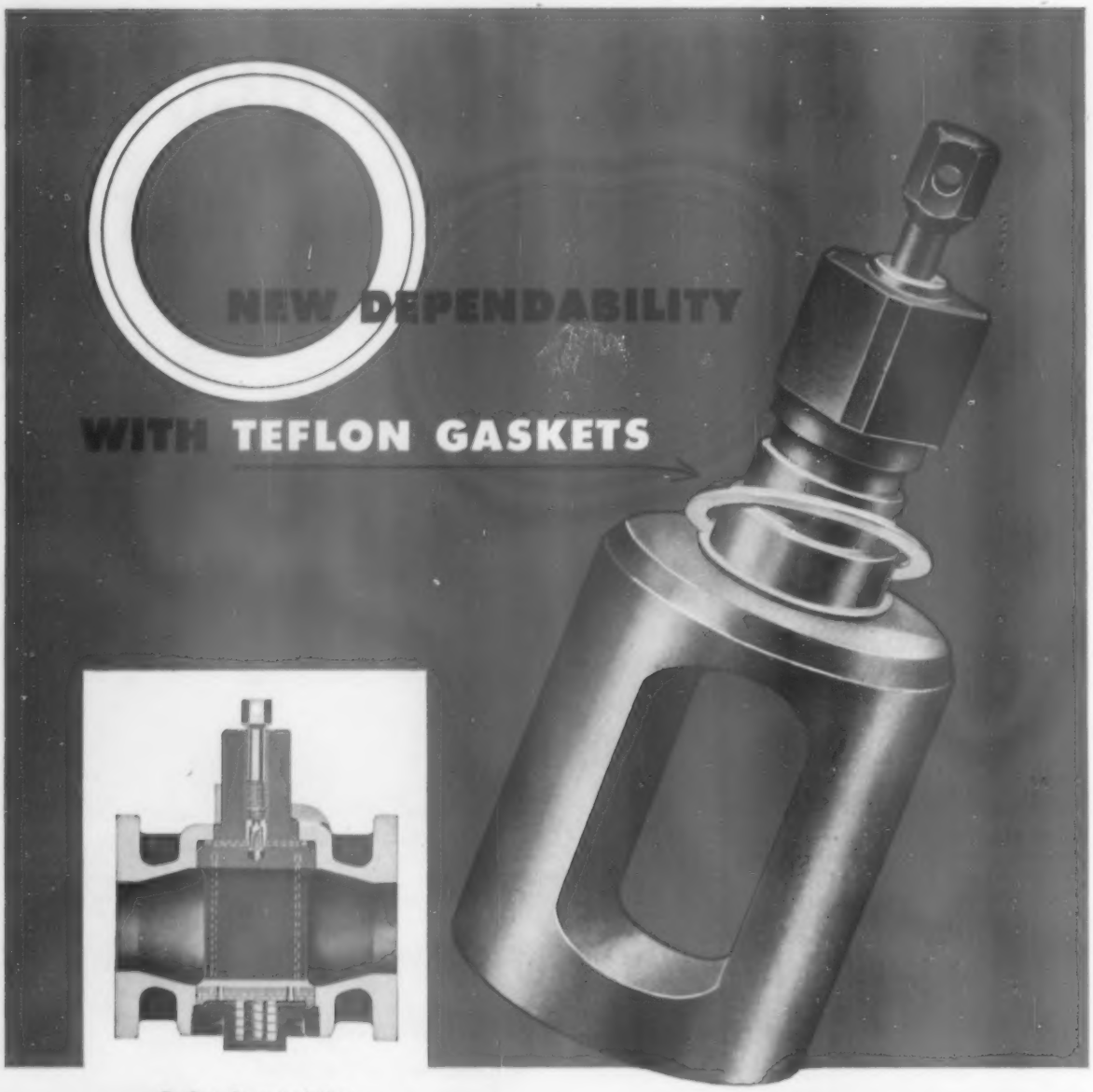
Please send me samples and further information on *POLYKEN* PROTECTIVE TAPE COATINGS.

Name_____ Title_____

Company_____

Street Address_____

City_____ Zone____ State_____



Gasket characteristics:

- self lubricating
- can't bind
- unique shape maintains lubricant release
- pressure tight

Round Port Valves—100% Obstruction Free • Rectangular Port Valves with Full Pipe Area • Venturi Valves for Economy

Now standard on a.c.f. Lubricated Plug Valves, this exclusive a.c.f. development gives protection against head leakage at high pressure and at temperatures up to 450° F. Greatly reduces turning torque. Increases service life without materially affecting price.

Four years of field service tests under most exacting conditions have confirmed the effectiveness of this new discovery. Get all the facts from your nearby a.c.f. valve representative.

a.c.f. CYLINDRICAL FULL PIPE AREA PLUG VALVES

Representatives in 50 Principal Cities

Write for Catalog No. 4-OG and Price List. American Car and Foundry Company, Valve Division, 1501 E. Ferry Avenue, Detroit 11, Michigan

Full-View Mast gives **BOTH***

* *Derrick operating advantages*

* *Mast portability, economy, maximum utility...*

PLUS...

UNLIMITED VISIBILITY

The unique mast design gives both driller and derrick man unlimited visibility... every movement and operation... derrick floor — racking platform — crown block... is clearly in view.

GREATER FLOOR SPACE

The large drilling floor measures 24' from drawworks to pipe ramp and 27'8" from side to side. There is ample room on the drilling floor to place an independent rotary drive. There are no gin pole legs near the drawworks to obstruct catheading operations. No erection A-frame is used. The two lever lift raising legs become integral load carrying members after erection of the mast.

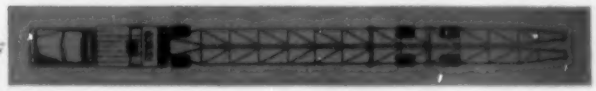
MAXIMUM SAFETY

The Full View Mast *does not* go over center during erection... the center of gravity remains on the pipe rack side of the main leg pedestals... no snubbing lines while erecting... no winch lines to lower.

Excellent stability and rigidity are inherent safety factors of the Full View Mast design.

ECONOMICAL TO RIG UP OR MOVE

The Full View Mast is engineered and built to combine operational advantages found in the standard drilling derrick with lower cost of moving and rigging up offered by the drilling mast. Assembly and erection are planned for a minimum in labor and equipment.



ROADABILITY—Complete mast columns side by side 7'10" road width with all raising tackle assembled.

IDECO

A DIVISION OF DRESSER EQUIPMENT COMPANY

P. O. BOX 1331 • DALLAS, TEXAS

IDECO

ONE OF THE DRESSER INDUSTRIES

REPUBLIC

SUPPLIES BOTH!

ELECTRIC WELD or SEAMLESS CASING and TUBING

FREE—for an interesting trip through Republic's new seamless mill, send today for this attractive picture booklet. Ask for No. ADV.-595.

For your casing and tubing requirements, Republic can now furnish either *Electric Weld* or *Seamless*.

Available in J-55 and N-80 grades, Republic Seamless Casing and Tubing are second to none in the industry for quality and dependability. That's because Republic employs the very latest manufacturing techniques—maintains rigid standards of quality-control from ore to finished product. And we ship by barge or rail from our new and conveniently located Chicago plant.

When you need H-40 or J-55, specify Republic's Normalized Electric Weld Casing and Tubing—widely used in the oil and gas industry for 25 years. Drillers like the important advantages such as the full-formed threads and uniform roundness that make for fast stabbing, spinning and tonging—strong, tight joints that resist pull-out—plus strong resistance to collapse due to high ductility and yield strength.

When you place your next order for casing and tubing, take advantage of Republic's integrated facilities—and *buy from one source*. Seamless sizes range from 2⅜" through 9⅝" O.D. Electric Weld comes in sizes 2⅜" through 13⅜" O.D. For complete information call your nearest Republic sales office. Or write to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC
CASING AND TUBING
Electric Weld and Seamless

Bump that assures positive results

When fire strikes, seconds count . . . your fire extinguishers must be the right type and function properly from the very start . . . failure means serious losses.

The growing popularity of the highly effective powdered dry chemical fire extinguishing agent may be hampered by a drawback . . . settling or packing can occur after a lapse of time. However, with C-O-TWO Dry Chemical Type Fire Extinguishers there's no chance of this happening.

The exclusive inverting and bumping design of C-O-TWO Dry Chemical Type Fire Extinguishers provides mechanical breakage of the dry chemical by shifting its position in the cylinder. This outstanding mechanical breakage, plus continuous inert gas pressured agitation or fluffing of the skillfully blended free flowing dry chemical, guarantee lasting, foolproof fire protection.

No other brand on the market today gives you this extra margin for positive results. Inverting and bumping is only one of many unique design advantages that make C-O-TWO Dry Chemical Type Fire Extinguishers your best buy for killing flammable liquid and electrical fires, as well as surface fires involving ordinary combustible materials.

With C-O-TWO Dry Chemical Type Fire Extinguishers the heat-shielding dry chemical is a non-conducting, non-abrasive, non-toxic, finely pulverized powder compound . . . blankets fire instantly. Sizes range all the way from 4 to 150 pounds capacity . . . all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories and Government Bureaus.

Act now for complete free information on these top quality, sure-acting fire extinguishers. Remember fire doesn't wait . . . get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

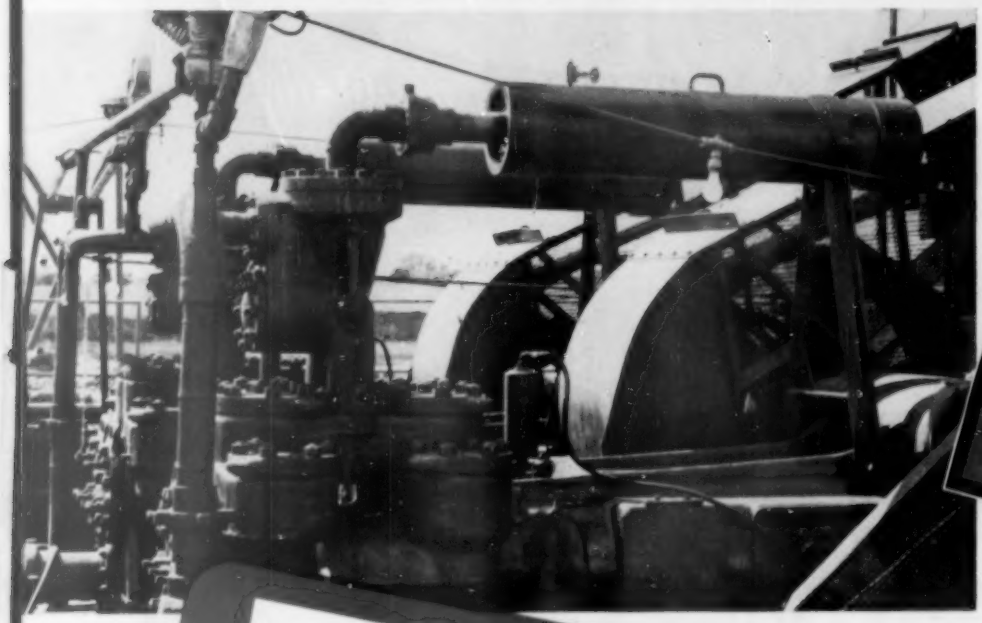
C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

Compound power pumps without excessive vibration



MINIMIZE LINE SHOCK

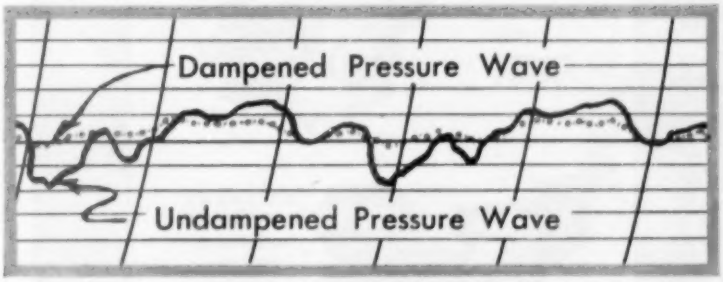
●

ELIMINATE DESTRUCTIVE SURGING THAT CAUSES LEAKS IN HIGH PRESSURE MUD LINES

●

LENGTHEN THE LIFE OF ROTARY HOSE

TIW PUMP CHAMBER SMOOTHS OUT PRESSURE VARIATIONS



Effect of dampening on slush pump discharge pressure wave. Pressure recordings taken between dampener and pump.

Pressure variations causing excessive mud line vibration is a serious problem . . . the line shock shortens the life of rotary hose and invites leaks throughout the high-pressure mud lines.

The TIW Pump Chamber was developed to smooth out pressure variations in the output of slush pumps, so that power pumps could be compounded without excessive vibrations. It greatly reduces destructive surge and pulsation in high pressure mud lines, lengthening life of mud lines and rotary hose, and practically eliminating mud line leaks. The pressure rating of the pump can be increased by 7% to 8% without shortening the life of the pump.

Using a construction completely unlike the conventional surge chamber, the TIW Pump Chamber replaces the manufacturer's air chamber on any pump. It may be rigidly mounted on the pump as shown above, or installed at any point in the flow line.

The efficiency of the TIW Pump Chamber is proved by over five years of successful field service. Reduction of pressure variation is indicated on the performance card (at left) of a typical installation.

TEXAS IRON WORKS

Manufacturers of: T.I.W. Portable Rigs . . . T.I.W. Safety Joints . . . T.I.W. Rotary and Casing Slips . . . T.I.W. Grief Stem Safety Valves . . . T.I.W. Gas Lifts . . . T.I.W. Packers for every purpose . . . T.I.W. Pump Chambers . . . T.I.W. Mudmasters . . . T.I.W. Drillmasters . . . and many other oil field tools.

GENERAL OFFICE and MAIN PLANT: 1401-1423 Maury Street, Houston 10, Texas
Other Shops at Victoria and Corpus Christi.
EXPORT REPRESENTATIVE: Val R. Wittich, 30 Rockefeller Plaza, New York, N. Y.

Which of these is your pumping problem?

Name just about any fluid you consider "hard to handle" and we will show you a De Laval pump that will do the job efficiently and at low cost.

De Laval IMO and CPO pumps have solved problems on a wide range of products—hot or cold, acidic or alkaline, viscous or corrosive, clear or filled with suspended solids. IMO and CPO models are available for early delivery.

Your De Laval representative is an experienced application engineer. Consult him on your pumping problems or write today for literature.

DE LAVAL IMO PUMPS
capacities to 750 gpm
pressures to 1500 psig

DE LAVAL CPO PUMPS
capacities to 2000 gpm
heads to 200 feet

DE LAVAL *Pumps*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL 839

Repairing wrapped coating rupture with simple "patch" application of "Scotchrap" Tape No. 50. Photo courtesy Lake County Gas Co., Willoughby, Ohio, and Hattendorf & Bliss, Contractors, Euclid, Ohio.

"SCOTCHRAP"

is good public relations, too!

...no smoke, no smell—just complete pipe protection

Gone are the smoke and reek of hot coatings . . . gone, too, are complaints from residents when pipe must be installed or repaired in built-up neighborhoods. There is no danger of burns caused by flame and spilled coating either—thanks to "Scotchrap," the polyvinyl chloride tape with the pressure-sensitive adhesive.

"Scotchrap" is quick and clean in application; provides a pin-hole free, anti-corrosive coating that goes on *cold*. Applied in a half-lap, "Scotchrap" becomes an impervious skin capable of providing complete protection against corrosive soil chemicals, oils, fats, stray ground currents, soil bacteria, and fungi. It is suitable for above-ground or buried pipe in pipe lines, tank farms, chemical plants, gas and water mains, and service lines; is extensively used today for wrapping small diameter pipe, sections of uncoated pipe, and joints and couplings on mill-wrapped pipe.

"Scotchrap" is sold by the square in 1″, 2″, 4″, 6″, and 8″ widths. Two thicknesses: 10 and 20 mils. Why not order a trial supply today? For more information, write Minnesota Mining and Manufacturing Company, Dept. OG-5244, St. Paul 6, Minn.

3M COMPANY

The term "Scotchrap" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ontario, Canada.

SCOTCHRAP BRAND PIPE INSULATION

CONTINENTAL RED SEALS

...Run for years and years

All through the oil fields, you'll find proof of the stamina that has made Continentals first choice for so many tough jobs. Weather-scarred veterans—many of them older than this one—are still turning in their full work quota, week in and week out. There are Red Seal* models engineered for every oil field application—models at closely-spaced power levels, for use on all standard fuels. For MORE power, and BETTER power, ask your supply store for Red Seal.

CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

*TM REG.

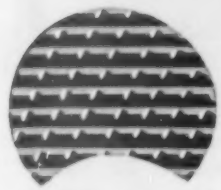
★ High-output air-cooled military models developed jointly by Army Ordnance and Continental are now available for commercial applications where high output (375 to 1,000-plus h.p.) low weight, and exceptional compactness are required. For information, address Continental Motors Corporation, Military Division, 76 North Getty Street, Muskegon, Michigan.

1819 BROADWAY, NEW YORK 23, NEW YORK • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA. • 6210 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF. • 910 S. BOSTON ST., ROOM 1008, TULSA, OKLA.

PARTS AND SERVICE COAST TO COAST

Continental Motors Corporation

MUSKEGON, MICHIGAN



REGULAR BUTTON

CONVERTING BUTTON

You too will like WEB WILSON Rotary DRILL PIPE SLIPS because they are *ruggedly strong*, yet *light in weight*, with *short handles for easy operation*. ★ The self-adjusting Slip Buttons rock just enough to take a *quick, non-slip grip*, and they HOLD even on the hardest drill pipe. ★ They are what you need for GREATER SPEED, GREATER SAFETY and GREATER ECONOMY— where do you want 'em delivered?

Oil Tools INC. FIELD PROVEN

WEB WILSON

LOS ANGELES, CALIFORNIA • DALLAS, TEXAS • NEW YORK, N.Y.

Things are getting tougher!

As temperatures and pressures go up...and corrosion becomes more of a problem...the equipment you use becomes more important. That's especially true for liquid level gages.

You can expect, and get, exceptional service from Penberthy gages and valves under increasingly severe conditions.

Our experience enables us to help you specify... or even design to your particular needs...gage sets which give accurate readings for long periods, efficiently and economically.

● *To help you in specifying the right gages for your needs, write for Catalog 35. If your requirements are special, put our engineers to work on them*

PENBERTHY INJECTOR COMPANY
Division of the Buffalo-Eclipse Corporation
1242 Holden Avenue • Detroit 2, Michigan
Established 1866

Penberthy gage sets are made from carbon, chrome-moly and stainless steel as well as Monel metal. They are also available in acid bronze, Everdur, nickel and Hastelloy. All materials conform to or exceed requirements for maximum recommended pressures and temperatures. The finished products are rigidly inspected and tested under actual working conditions.

And, only with Penberthy Gages, do you get such features as the "Floating Shank" which automatically compensates for as much as ⅜" variation in center-to-center distance of the vessel tapping.

***There's Certain satisfaction in* PRODUCTS BY PENBERTHY**

- CYCLING JET PUMPS
- EJECTORS
- INJECTORS
- ELECTRIC SUMP PUMPS
- EDUCTORS
- EXHAUSTERS
- SYPHONS

Your TIME SAVER

A SERVICE OF **THE OIL AND GAS JOURNAL**
FOR THE CONVENIENCE OF OUR READERS..

as you **READ** through the pages of

and you **SEE**

PRODUCTS ADVERTISED

on which **YOU** WOULD LIKE MORE **INFORMATION**

use one of these cards

DROP IT IN OUTGOING MAIL
*NO POSTAGE REQUIRED

Mark here FOR MORE INFORMATION ON ADVERTISED PRODUCTS

Your inquiry will be forwarded to the supplier within 48 hours (or less) from the time we receive it.

To The Oil and Gas Journal:
I would like to receive details on products advertised in your issue of May 24, 1954

Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....
This card void after 90 days.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

2

To The Oil and Gas Journal:
I would like to receive details on products advertised in your issue of May 24, 1954

Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	
Page____ By____		Page____ By____	

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....
This card void after 90 days.

Your TIME SAVER

A SERVICE OF **THE OIL AND GAS JOURNAL**
FOR THE CONVENIENCE OF OUR READERS..

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

3

To The Oil and Gas Journal:
I would like to receive details on products advertised in your issue of May 24, 1954

Page____ By____	Page____ By____
Page____ By____	Page____ By____
Page____ By____	Page____ By____
Page____ By____	Page____ By____
Page____ By____	Page____ By____
Page____ By____	Page____ By____

PLEASE PRINT
COMPANY NAME.....
STREET ADDRESS.....
CITY.....ZONE NO.....STATE.....
NAME.....TITLE.....
This card void after 90 days.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
P. O. BOX 1260
TULSA, OKLAHOMA

1

as you **READ** *through the pages of*

and you **SEE**

PRODUCTS ADVERTISED

on which **YOU** WOULD LIKE MORE **INFORMATION**

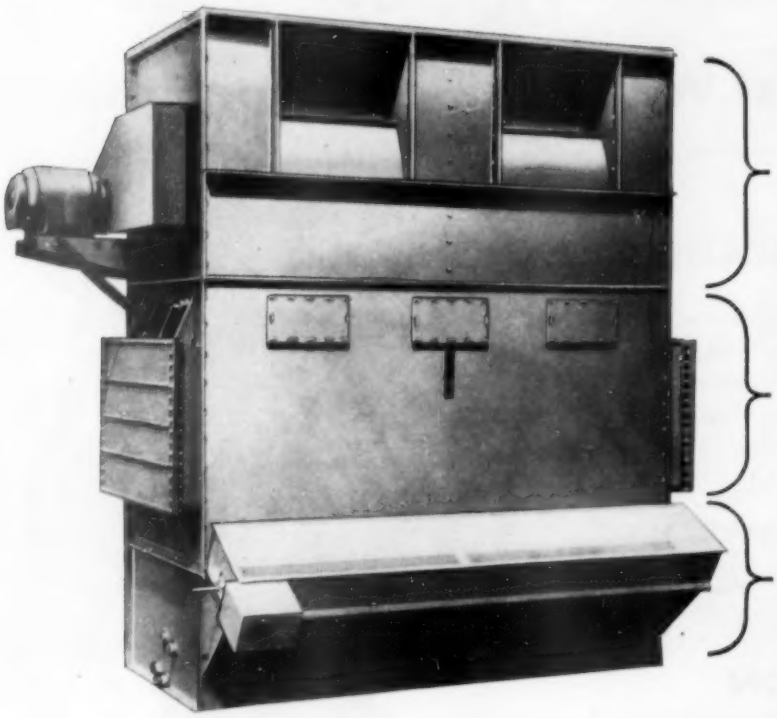
use one of these cards

NOTE PAGE NUMBER AND ADVERTISER ON CARD...

DROP IT IN OUTGOING MAIL
**NO POSTAGE REQUIRED*

Your inquiry will be forwarded to the supplier within 48 hours (or less) from the time we receive it.

Solve Big Cooling Problems with YOUNG EVAPORATIVE COOLERS



BLOWER SECTION

Built as a complete unit, this section consists of dynamically balanced multi-blade centrifugal blower, outlet scrolls for the blower housing, standard NEMA splash-proof motor, variable V-belt drive and air discharge duct. The blower fan is corrosion-resisting, double inlet design, dynamically balanced for long life, quiet operation.

COIL SECTION

Cooling coil section consists of straight, round, seamless tubes—copper, stainless steel or red brass—each rolled into header plates with baffles for multi-pass flow. Gasketed tank cover plates are used on coils for water and oil cooling. Tubes for cooling gases are rolled into steel tank headers with plugs opposite each tube for easy cleaning. Assembly also includes spray header, spray nozzles, moisture eliminators and inspection windows.

SUMP SECTION

The bottom, or sump section, consists of a water-tight, galvanized and rust-resistant reservoir for makeup and spray water, self-regulating float valve, and thermostatically controlled automatic shutters for the air inlet, air outlet, or both. The float valve automatically provides the volume of makeup water required to compensate for water losses due to evaporation and wastage.

Full length access door in sump tank for ease of service, and cleaning sump.

COOL— Jacket Water . . . Lube Oils . . . Natural Gas

CONDENSE— Hydrocarbons . . . Steam . . . Other Fluids

Temperatures Obtainable Approaching the Air Wet Bulb Temperature

For maximum heat transfer efficiency, select Young Evaporative Coolers to solve your big cooling problems. Versatile in design and completely self-contained, YEC units cool the liquid or gas in the coil by evaporation when water is sprayed over the coil assembly. Units are used primarily for cooling engine jacket water and lubricating oil (gas, gasoline, Diesel engines), steam, compressed air, natural gas or other fluids, and also for condensing steam, hydrocarbons, etc.

Designed and engineered to give long, efficient performance, Young Evaporative Coolers are built in six basic models, either with single or two coil assemblies. Normal operating pressures of 100 psig are used for water and oil cooling. However, for steam and natural gas cooling and condensing, pressures up to 2000 psig can be handled. Unit capacities range from 876,000 to 8,712,000 Btu's per hour.

Coil assemblies for water, oil and gas service consist of straight, round, seamless copper, stainless steel or red brass tubes, each rolled into thick header plates at each tank with multipass baffles. Oil cooling units use chain-type agitator strips inside the tubes to increase heat transfer. Straight Admiralty tubes in the Gas Cooler coil assembly are rolled into steel tanks with a plug opposite the end of each tube for easy cleaning. For special cooling jobs, call on a Young Representative, or write direct.

YOUNG

Young Quality

GET THIS NEW CATALOG!

Illustrated Catalog No. 1952 gives specifications, dimensions, capacities and features of YEC units.

YOUNG . . . AN "OLD" NAME IN HEAT TRANSFER ENGINEERING

YOUNG RADIATOR COMPANY

Dept. 204-E • Racine, Wisconsin • Factories at Racine, Wisconsin and Mattoon, Illinois

OIL FIELD DISTRIBUTORS: TULSA—J. R. Meek Co., 1341 S. Boston St., Rm. 109

LOS ANGELES—Flournoy & Everett, Inc., 5043 Santa Fe Ave.

MUSKEGON—Harold J. Young, 206 Montgomery Blvd.

Other Representatives in Principal Cities

STAYNEW FILTERS' DOUBLE ACTION

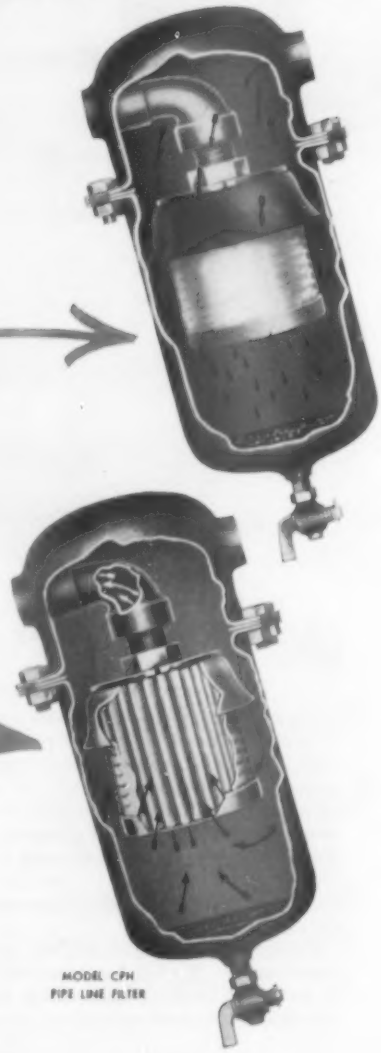
Guards Against Water, Oil and Pipe Scale

MECHANICAL SEPARATION

1. Deflector cup directs flow of air or gas together with water, oil and dirt to the walls of the housing and then downward at high velocity into the base where liquid and heavier dirt particles are deposited.

FILTRATION

2. Air or gas, having been mechanically cleaned, rises at low velocity through the Radial Finned Filtering element or insert which removes the lighter air-borne material.



MODEL CPH
PIPE LINE FILTER

This exclusive Double-Action principle of Staynew Pipe Line Filters assures sustained, trouble-free operation. Inexpensive, quickly installed and easily maintained, these filters keep air operated or controlled equipment free from pipe scale, dust, dirt, and condensate. Wherever you require air and other gases *clean* and *dry*—demand and get—Staynew Pipe Line Filters.

Write today for complete Staynew Pipe Line Filter Bulletin B-1A.

Representatives in Principal Cities

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION

5 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

Thermoid Powerflex . . . Recognized Standard of Rotary Hose Quality

Here's Rotary Hose that's unrivalled for strength and flexibility. Thermoid Powerflex combines oil-and-abrasion-resistant synthetic tube with impregnated multi-ply woven fabric and high tensile steel cable reinforcement. Its tough, extra-heavy cover resists weather and abrasion.

Patented full-flow couplings, securely anchored to each individual cable, are guaranteed leak-proof—positively cannot blow off. Powerflex is available in all standard sizes and lengths. It is pre-tested to 5,000 psi . . . exceeds all API requirements.

Get premium quality at regular price. Specify Thermoid Powerflex Rotary Hose—the most widely imitated Rotary Hose in the oil fields!

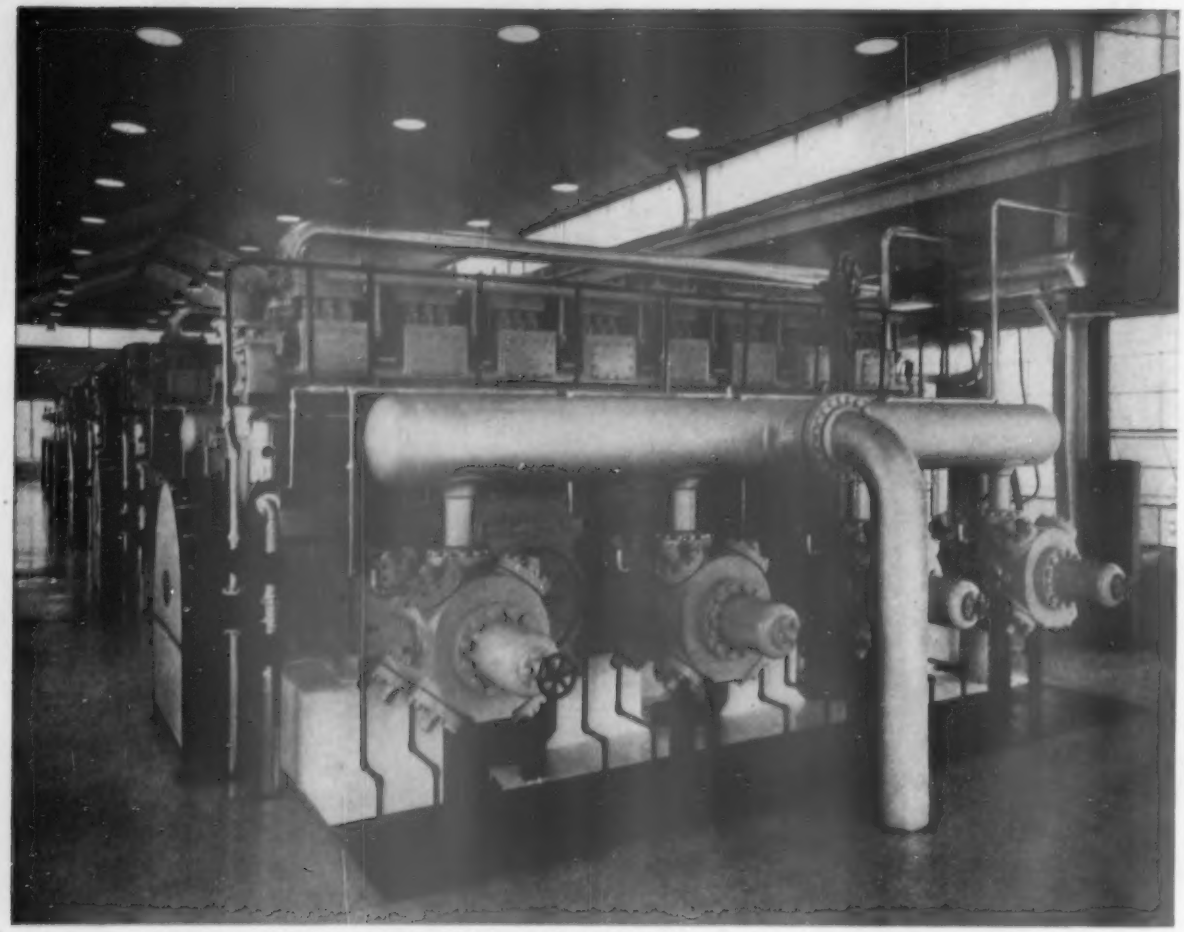
Mid-continent Office and Warehouse, Houston, Texas
California Office and Warehouse, Los Angeles, California

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

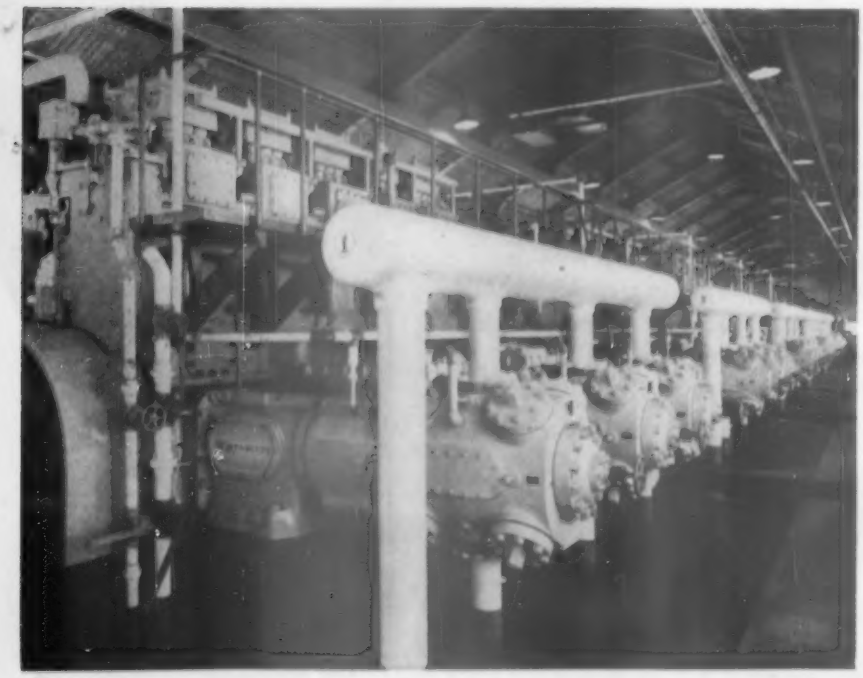
Thermoid

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

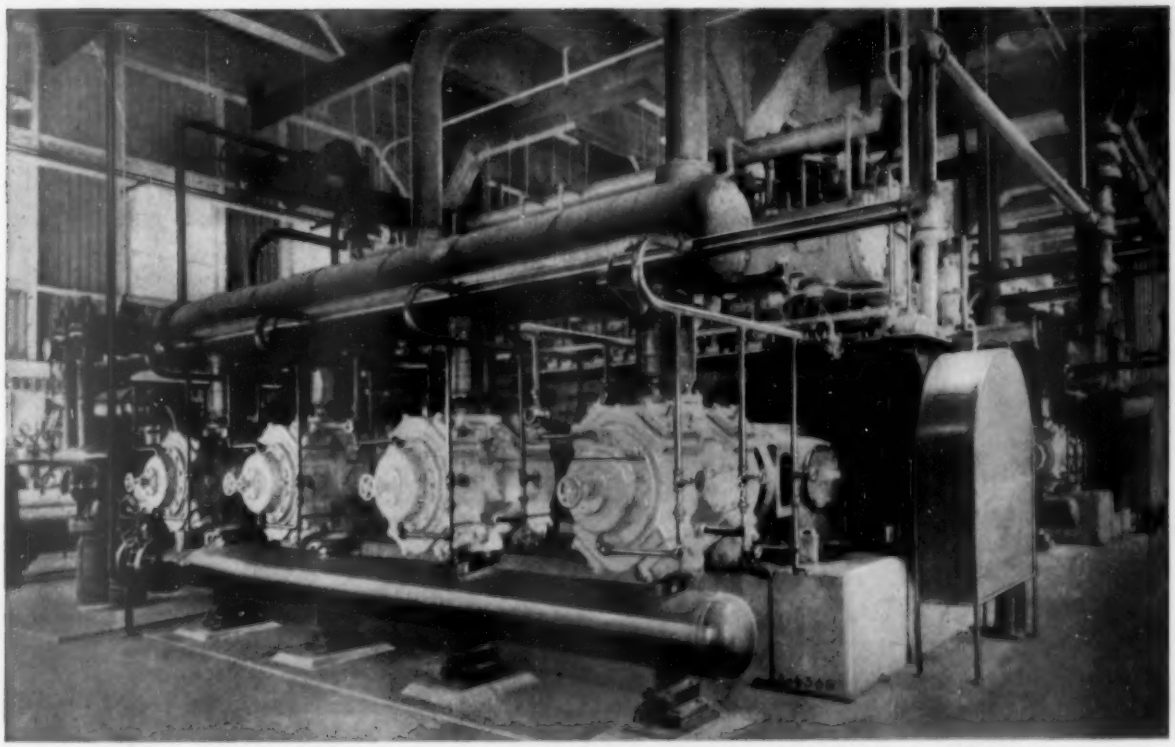
Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



EFFICIENT WORTHINGTON UTC ENGINE-COMPRESSORS, like these of the Tennessee Gas Transmission Company, are fuelled by a tiny part of the gas they compress. The UTC's range in size from 1,000 to 2,000 hp.



10,000 HORSEPOWER IS DELIVERED by these ten Worthington UTC Engine-Compressors in the Navajo Station of the El Paso Natural Gas Line. Two 2000-hp Worthington UTC compressors are planned for the company's pending expansion at this station. They will handle a total of 687,000,000 cubic feet of gas when the installation is completed.



THE TEXAS COMPANY compresses propane for refrigeration purposes with two 1000-hp Worthington LTCH Engine-Compressors at their Port Arthur, Texas plant. The LTCH's range in size from 440 to 1100 hp.

Here are the right units for any gas compression job

• More and more leading names in industry are turning to Worthington UTC Uniflo and LTCH Angle Gas-Engine Compressors as the most dependable and efficient means of compressing gas.

The installations shown here are just three of the many Worthington-equipped plants throughout the country. The long, dependable service these plants have obtained from their Worthington equipment is responsible for the fine reputation the UTC's and LTCH's have earned.

Performance reports show that the operating economy of these units, under conditions of fluctuating gas flow and pressure, is unsurpassed. That's because over half a century of testing and research has made Worthingtons the finest compressors obtainable.

In addition to pipeline gas compression, the versatile UTC's are in operation on many other jobs such as pressure maintenance in oil wells, varied service in natural gasoline plants, processing petro-chemicals from natural gas, general process work, and many refrigeration applications.

Find out how a Worthington UTC or LTCH can improve your gas compression operations. Get in touch with your nearest Worthington district office or write directly to Worthington Corporation, Engine Division, Section EK.3.5, Buffalo, N. Y. EK.3.5

WORTHINGTON

ONLY WORTHINGTON COMPRESSORS GIVE YOU FEATHER VALVE PERFORMANCE

Y-Type • Engine-Starting • Horizontal • Portable • Radial • Gas Engine

All Sizes . . .

COLUMBIAN

BOLTED STEEL TANKS

Whip Any Storage Problem and Save Money!

Large or small, near or far . . . count on Columbian for the solution to your storage needs. Through over 60 years, leadership in precision engineering has earned Columbian first place in the hearts of oil producers the world over. Easy assembly, long trouble-free service life, ease of transport and the convenience of take-down and re-erection make Columbian your most economical storage buy per dollar. Write today for the complete story . . . specifications, photos, prices.

Special Columbian COP-NIC tanks, ideal for sour crudes, will be available as conditions permit.

Also Save with Columbian Metal Buildings

Rigid, weather-tight, fire-safe, sturdy . . . just the thing for warehouses, engine houses, garages, equipment and storage houses. Easily erected without special skill or tools. Write for catalog.

COP-NIC COPPER NICKEL ALLOY TANKS FOR THE WORLD

Call Your Nearest COLUMBIAN Distributor

COLORADO
O'Neill Tank Company, Inc.
Sterling, Colo.

KANSAS
O'Neill Tank Company, Inc.
P. O. Box 771
Great Bend, Kansas
Hays, Kansas
Hill City, Kansas

LOUISIANA
McGuffie Tank Company
P. O. Box 724
Shreveport, La.
McClatchey Tank & Supply Service
P. O. Box 719
Lafayette, La.

OKLAHOMA
Continental Tank Company
P. O. Box 5038—Farley Station
Oklahoma City, Oklahoma

TEXAS
Gray-Brown Tank Company
P. O. Box 924
Longview, Texas
Mapp Tank Company
P. O. Box 1349
Odessa, Texas
Martin Tank Company
P. O. Box 138
Corsicana, Texas
Kilgore, Texas
Continental Tank Company
Odessa, Texas
Snyder, Texas
Federal Tank Company, Inc.
1400 City National Bank Bldg.
Houston, Texas
Jackson Equipment Co.
P. O. Box 1625
Wichita Falls, Texas
Weston Tank Company
P. O. Box 941
Odessa, Texas
Columbian Steel Tank Co. (Warehouse)
P. O. Box 18057
Houston, Texas
B. A. Box
P. O. Box 547
Beeville, Texas

WYOMING
O'Neill Tank Company, Inc.
P. O. Box 154
Casper, Wyoming

COLUMBIAN STEEL TANK CO., P. O. Box 4048-J, Kansas City, Mo.

Here's performance you can count on

RCA 2-WAY RADIO

Straight-Forward Circuits to bring your message in without interference—even when you're operating close to an adjacent-channel transmitter.

Automatic Modulation Control to lower loud voices, raise weak voices, to correct level, without distortion.

Long Tube Life for dependable, low-maintenance service. Half the tubes operate at 1/5 maximum ratings.

Full Frequency Range: Fleetfone 30-50 mc, Carfone 152-174 mc.

Fits Anywhere: Transmitter-receiver unit takes no more space than a spare tire, mounts in any position, operates at low drain on 6- or 12-volt battery.

Stable Performance for minimum distortion. Ovenless crystals stay on frequency without warm-up, without wasting stand-by power.

Single-Case Construction for easy tuning and servicing. Offers plenty of protection—makes chassis and all components instantly accessible.

For Extra Dependability, installation and service facilities of the RCA Service Company are available.

* * *

For Complete Details on RCA 2-Way Radio contact the Communications Specialist at your nearest RCA Office or MAIL COUPON NOW.

RADIO CORPORATION of AMERICA
COMMUNICATIONS DIVISION **CAMDEN, N. J.**

Radio Corporation of America
Communications Division
Camden, N. J.
Dept. E-89, Building 15-7

Please send me information on RCA 2-Way Radio
☐ Carfone ☐ Fleetfone
☐ Have RCA Representative call

Name_____

Address_____

Company_____

City_____ State_____ Zone____

...invisible values

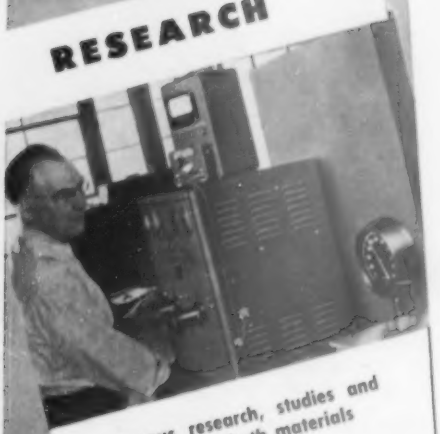
Separate an Ashcroft Gauge into its component parts and many of the reasons that have made it the leader for over a century remain unseen. For they are invisible values . . . equally as important to the sustained high accuracy and long-life endurance of the gauge as the Bourdon Tube, the movement, linkage, case and other components.

Creative research, highly functional design, quality control of both materials and methods and rigid manufacturing standards are "built into" every Ashcroft Gauge . . . are the fundamental reasons why high performance standards are expected and attained in every gauge bearing the Ashcroft Shield.

The new Ashcroft Gauge Catalog 300 is now available. Write for a copy.

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is thoroughly acquainted with the various lines of Ashcroft Gauges. You can depend on him to help you in selecting the right type for your particular needs—and to deliver promptly.

RESEARCH



Continuous research, studies and tests guarantee both materials and methods.

Completed designs as well as individual components are subjected to "breakdown" tests in the Research Laboratory pictured here. These tests subject all materials and methods to vigorous analyses . . . are designed to keep Ashcroft ahead of future as well as current gauge requirements regardless of industry demands.

ASHCROFT GAUGES

of ASHCROFT GAUGES

1850 ASHCROFT U.S.A.

DESIGN

Sustained accuracy is the major objective of the design function.

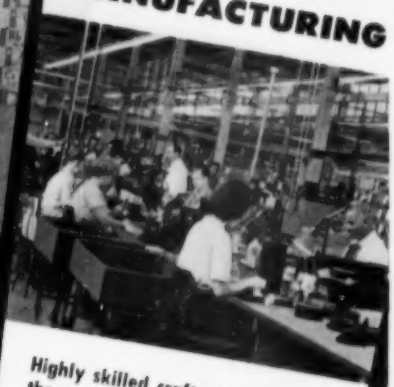
Where research largely determines materials and methods to be used, the design function is primarily concerned with sustained high accuracy. The drafting room shown above is one of the most essential "creative centers" in the progress of an Ashcroft Gauge from original research to finished product.

QUALITY CONTROL

Ashcroft metallurgists subject all raw materials and parts to thorough examination and tests.

Augmenting research and design, quality control exhaustively examines, for functional surety, all materials used in the gauge as well as the finished product. No substitute for final inspection, quality control "guards the gauge" from original design to final manufacture.

MANUFACTURING



Highly skilled craftsmen command the most modern equipment and plant facilities to assure manufacturing excellence.

This unbeatable combination produces the Ashcroft Gauge . . . an achievement in metal . . . first conceived by Ashcroft research and design engineers and completed by unmatched production techniques. Pictured is one of the assembly sections where perfection of gauge performance is considered a manufacturing challenge as well as a responsibility.

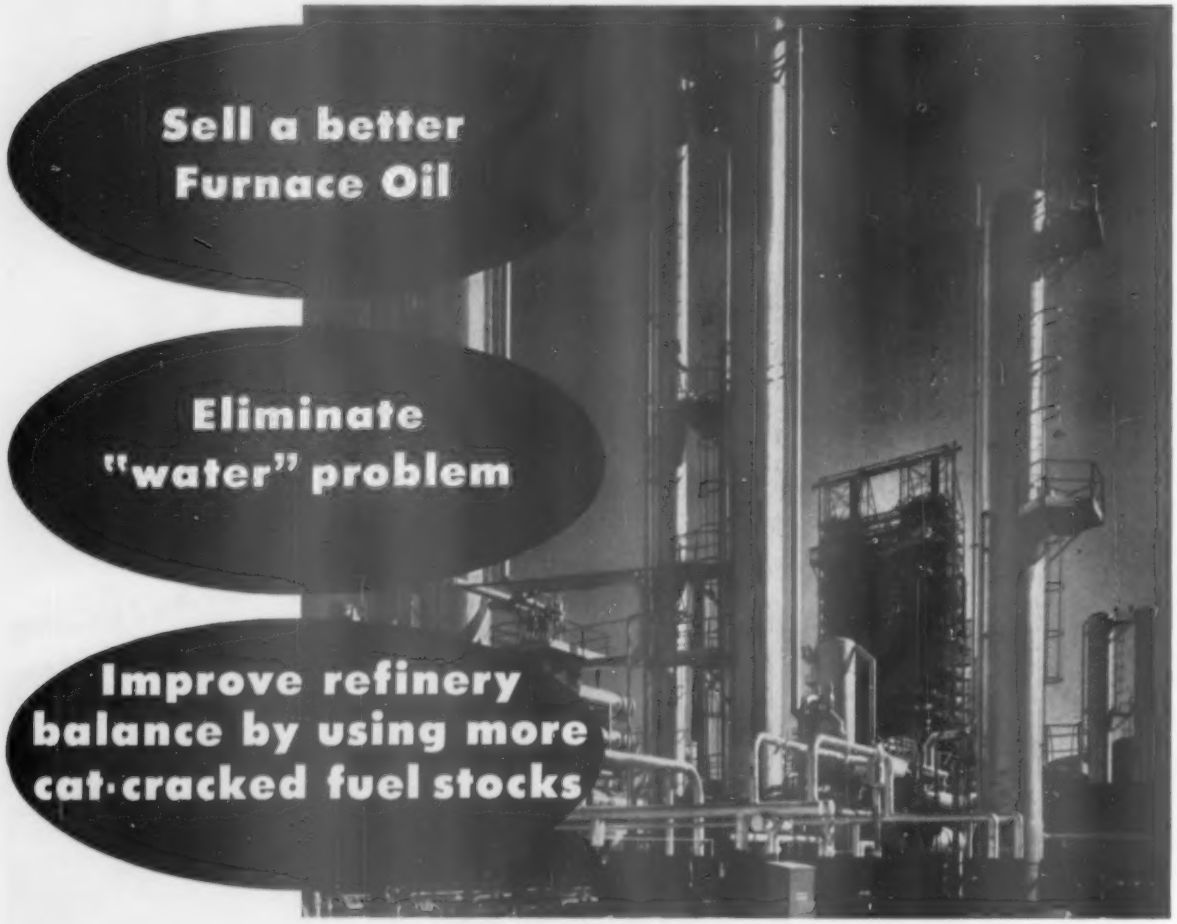
1850 ASHCROFT U.S.A.

A PRODUCT OF MANNING, MAXWELL & MOORE, INC.

STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

With NEW Dispersant FO



Dispersant FO is a new anti-gumming, rust-inhibiting additive that greatly reduces, even eliminates, deposits and screen clogging in home heating units and storage tanks. Your product with FO will offer dealers many competitive advantages and greatly reduce their number of costly service calls due to clogged filter screens and nozzles.

"Water" is always *the big problem* for the distributor, dealer and home user. The active ingredient in FO is an entirely new chemical, developed especially for use in furnace oils. NEW DISPERSANT FO DOES NOT EMULSIFY WATER WITH BURNER OIL. It will settle the water out of burner oils in short order to provide a "dry" fuel.

Furnace oil with FO has exceptional rust-proofing properties. Steel and iron surfaces in contact with the oil are made corrosion resistant. The "water layer" of the tanks and lines get protection too. A portion of Dispersant FO is water extractable, affording rust and corrosion protection to that portion of the tank not in direct contact with the oil.

This new additive improves stability and permits the blending of higher percentages of cat-cracked stocks without additional gum formation. It improves refinery balance, and you can cut costs by reducing the severity of acid treating of your cat-cracked heating stocks.

The stabilizing action and rust-inhibiting quality of Dispersant FO are obtained at very low dosages. Usually added in the ratio of 1 pint per 1000 gallons of oil stock, at any temperature, prior to shipment by tanker, pipe line or truck.

ORONITE CHEMICAL COMPANY

15 Sansome St., San Francisco 4, Calif. • 714 W. Olympic Blvd., Los Angeles 15, Calif.
30 Rockefeller Plaza, New York 20, N. Y. • 600 S. Michigan Ave., Chicago 5, Ill.
Mercantile Securities Building, Dallas 1, Texas

A Service Advertisement By LUNKENHEIMER

Tips on ordering valves

Guessing can be costly when you order valves. When in doubt, give your distributor the following information, and he will recommend the right valve for your particular application:

1 Specify the size (the inside diameter of the valve-end in inches).

2 Specify the maximum pressure the valve will be subjected to.

3 Specify the maximum temperature the valve will be subjected to.

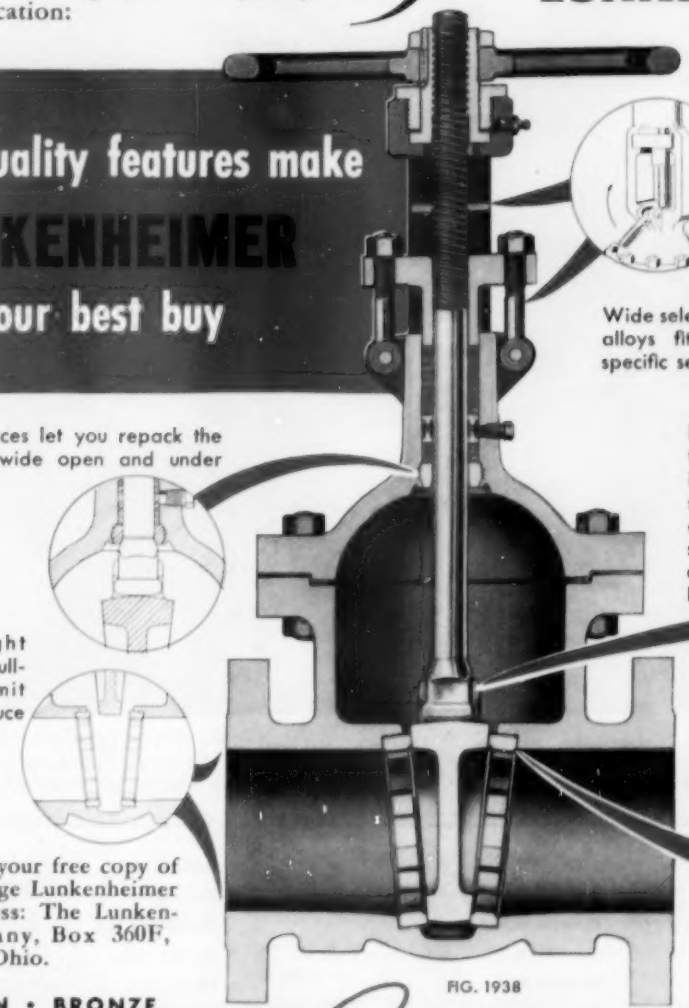
4 Specify the type of service — steam, hot or cold water, oil, gas, etc.

5 Specify any special corrosive condition the valve must stand.

6 *And for Proved-in-Service quality, specify*

LUNKENHEIMER

These quality features make LUNKENHEIMER your best buy



Swing-down eye-bolts can't become detached—and a convenient shelf holds the gland flange up, out of the way during repacking.

Wide selection of trim metals and alloys fit the valve to meet specific service conditions.

Backseating surfaces let you repack the valve when it's wide open and under pressure.

Flexible tee-head stem connection permits the disc to adjust to its seat without binding, at the same time affording the strongest connection known.

Smooth, straight through-way and full-rising disc permit even flow and reduce turbulence.

Shoulderless seat rings never warp or wedge out of place—they seat tighter with service. This is an original Lunkenheimer feature.

Write for your free copy of the new 500-page Lunkenheimer Catalog. Address: The Lunkenheimer Company, Box 360F, Cincinnati 14, Ohio.

FIG. 1938

STEEL • IRON • BRONZE

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-653-11

Announcing Parker

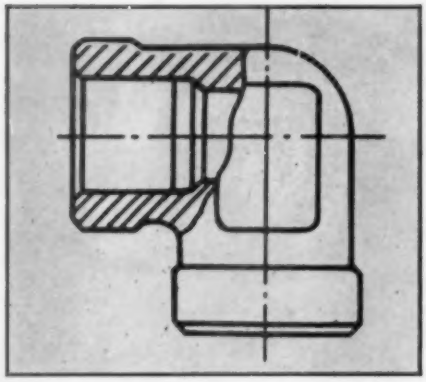
Simply insert tube, then weld! No wonder the new Parker *Weld-lok* fittings are so easy to use . . . by anyone anywhere. You don't need special fixtures or equipment to make a fused joint that will be unaffected by vibration, shock or thermal distortion. These new *Weld-lok* fittings are now offered for tubing sizes of ¼ through 2 inches outside diameters.

CALL YOUR NEAREST DISTRIBUTOR FOR PARKER INDUSTRIAL FITTINGS

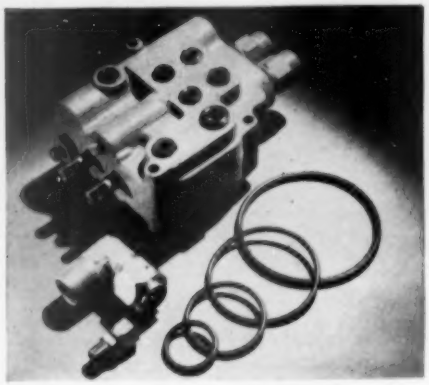
Akron 9, Ohio	B. W. Rogers Co. 850 South High St.
Baltimore 13, Md.	Carey Machinery & Supply Co. 3501 Brehms Lane
Baltimore 5, Md.	Whitehead Metal Products Co. 4300 E. Monument St.
Beaumont, Tex.	Standard Brass & Mfg. Co. 705 Milam St.
Birmingham, Ala.	Mill & Textile Supply, Inc. 3128 Third Ave. South
Boston 15, Mass.	A. E. Borden Co., Inc. 176 Brookline Ave.
Buffalo 7, N. Y.	Whitehead Metal Products Co. 2128 Elmwood Ave.
Cambridge 39, Mass.	Whitehead Metal Products Co. 281 Albany St.
Cedar Rapids, Ia.	Globe Machinery & Supply Co. 309 8th Ave. S. E.
Charleston, W. Va.	Persingers, Inc. 514 Elizabeth St.
Charlotte 1, N. C.	Industrial Piping Supply Co. 1501 Dowd Rd.
Chicago 14, Ill.	Wallace Tube Co. 1300 Diversey Parkway
Cincinnati 29, Ohio	Williams & Co. 3231 Fredonia Ave.
Cleveland 14, Ohio	B. W. Rogers Co. 1279 East 12th
Cleveland 14, Ohio	Williams & Co. 3700 Perkins Ave.
Columbus 8, Ohio	Williams & Co. 851 Williams Ave.
Dallas 9, Tex.	Metal Goods Corp. 6211 Cedar Springs Rd.
Davenport, Ia.	Globe Machinery & Supply Co. 410 E. Second St.
Dayton 10, Ohio	J. N. Fauver Co. 1534 Keystone Ave.
Denver 2, Colo.	Metal Goods Corp. 2425 Walnut St.
Des Moines 8, Ia.	Globe Machinery & Supply Co. East First & Court Ave.
Detroit 1, Mich.	J. N. Fauver Co. 49 West Hancock St.
Harrison, N. J.	Whitehead Metal Products Co. 1000 South Fourth Ave.
Houston 3, Tex.	Metal Goods Corp. 711 Milby St.
Houston 1, Tex.	Standard Brass & Mfg. Co. 2018 Franklin St.
Indianapolis, Ind.	Avels Sales & Engineering Co. 16 W. 22nd St.
Jacksonville, Fla.	Florida Metals, Inc. 2937 Strickland St.
Kansas City 16, Mo.	Metal Goods Corp. 1300 Burlington Ave.
Knoxville 5, Tenn.	Leinart Engineering Co. 412 E. 5th Ave.

Weld-lok tube fittings

. . . machined from high-quality bar stock and forgings . . . for tubing ¼ through 2 inches O.D.



Cutaway view shows details of the simple *Weld-lok* design which makes *Weld-lok* fittings easy to use. They are steel or stainless steel.



What other Parker products interest you? *Triple-lok* flare tube fittings? *Ferulok* flareless fittings? Hydraulic control valves? O-rings?

Simply push the tube in the socket, then weld! That's how easy it is to install Parker's new *Weld-lok* fittings for tubing. They're designed for applications involving extreme temperatures, corrosion conditions, or wherever permanently welded tubing joints are needed.

Weld-lok fittings have a tapered socket that aligns and holds the tube while you weld. You don't need special gripping fixtures. During welding, extraneous material can't enter the flow passage to form an obstruction. The carefully designed wall section of the fitting induces just the right amount of heat penetration for a correctly proportioned weld.

When you use Parker *Weld-lok* fittings, you get a sturdy, permanently tight line . . . unaffected by vibration, shock, or thermal distortion. Also, the inside diameter of the fittings closely matches the inside diameter of tubing to provide free flow passage.

All commonly used connectors and body shapes are now offered for tubing sizes of ¼ through 2 inches outside diameters . . . steel or stainless steel.

Ask your Parker distributor for *Weld-lok* Catalog No. 4370. Then, to order, simply use the complete part number designated for each fitting. It indicates size, shape and material.

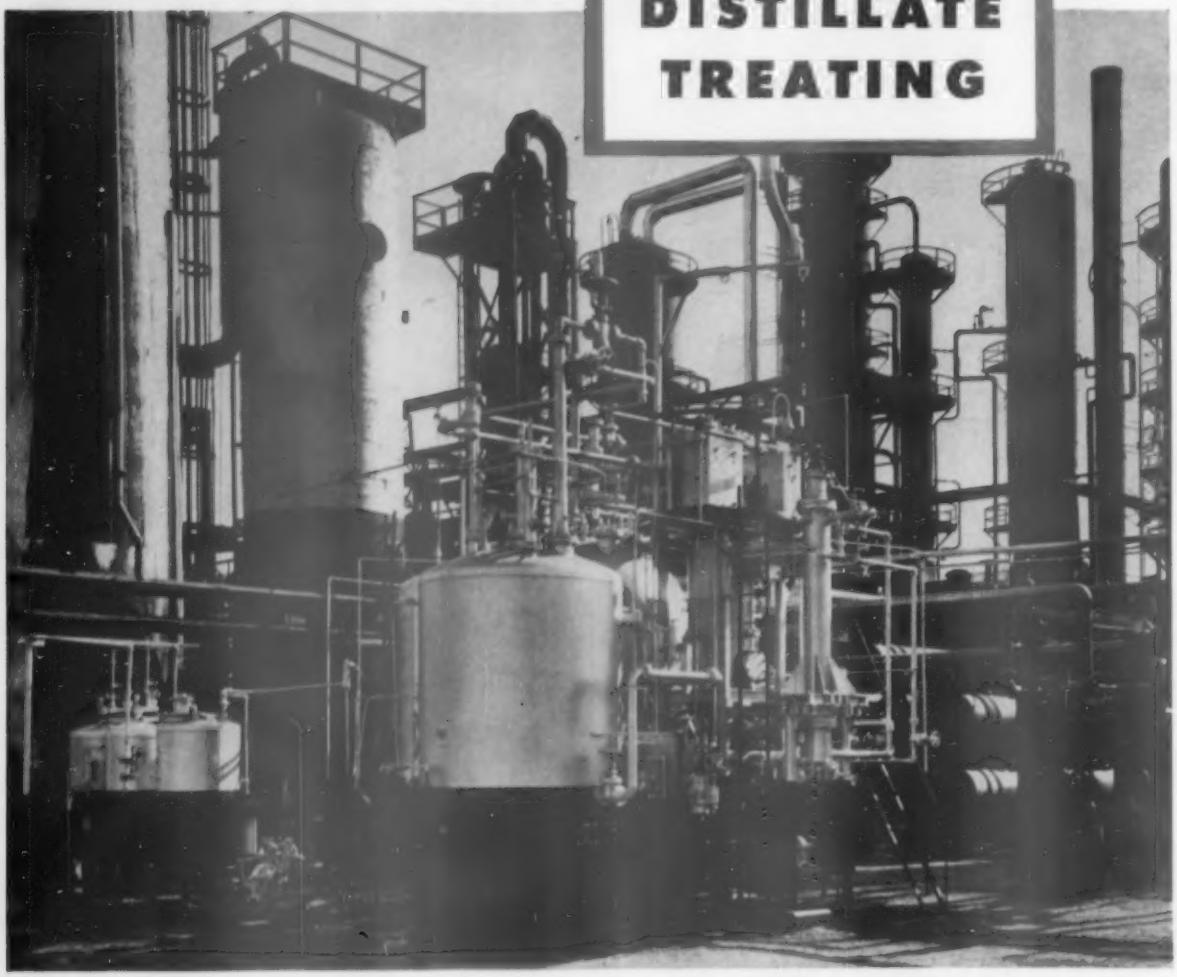
TUBE AND HOSE FITTINGS DIVISION
The Parker Appliance Company
Section 406, 17325 Euclid Avenue, Cleveland 12, Ohio

Parker
Hydraulic and fluid system components

Los Angeles, Cal.	Haskel Engineering & Supply 1236 S. Central Ave., Glendale
Los Angeles 12, Cal.	Metropolitan Supply Co. 353 E. 2nd St.
Louisville 3, Ky.	Williams & Co. 1109 S. Preston St.
Memphis, Tenn.	J. E. Dilworth Co. 730 South Third St.
Miami, Fla.	Florida Metals, Inc. 4100 N. W. 37th Ct. Hialeah
Milwaukee 3, Wis.	Morman Belting & Supply Co. 522 W. State St.
Milwaukee 4, Wis.	Wallace Companies of Wisconsin, Inc. 838 South 6th St.
Minneapolis 15, Minn.	Vincent Brass & Copper Co. 124 Twelfth Ave. South
New Orleans 12, La.	Metal Goods Corp. 432 Julia St.
Newport News, Va.	Noland Company 27th St. & Virginia Ave.
New York, N. Y.	Nielsen Hydraulic Equipment, Inc. 5 Penn Place, Pelham Manor 65
New York 14, N. Y.	Whitehead Metal Products Co. 303 W. 10th St.
Odessa, Tex.	Snyder Co., Inc. 2604 Kermit Highway
Philadelphia, Pa.	Louis H. Hein Co. 15 W. Lancaster Ave., Ardmore
Philadelphia 40, Pa.	Whitehead Metal Products Co. 1955 Hunting Park Ave.
Pittsburgh 33, Pa.	Williams & Co. 901 Pennsylvania Ave.
Portland 9, Oregon	Power Transmission Products 1107 N.W. 14th Ave.
Roanoke 10, Va.	Noland Company 1226 Center Ave. N. W.
Rockford, Ill.	Rockford Tool & Transmission Co. 802 Broadway
Salt Lake City 4, Utah	Pace-Turpin & Co. 726 South Third West
San Francisco 3, Cal.	General Machinery & Supply Co. 1346 Folsom St.
Seattle 9, Wash.	Palmer Supply Co. 222 Westlake North
Shreveport, La.	Standard Brass & Mfg. Co. 1557 Texas Ave.
St. Louis 15, Mo.	Metal Goods Corp. 5239 Brown Ave.
Syracuse 4, N. Y.	Whitehead Metal Products Co. 207 W. Taylor St.
Tampa, Fla.	Florida Metals, Inc. 222 N. 12th St.
Toledo 2, Ohio	Williams & Co. 650 E. Woodruff Ave.
Tulsa, Okla.	Ardun Supply Co. 303 S. Frankfort
Tulsa 3, Okla.	Metal Goods Corp. 302 N. Boston
Canada	Railway & Power Engineering Corp., Ltd.
Export	Mercator Corp. 438 Walnut St., Reading, Pa., U.S.A. Korody Marine Corp. 12822 Simms Ave., Hawthorne, California, U.S.A.

PETRECO

ELECTRIC DISTILLATE TREATING



The Petreco Electric Distillate Treating Process provides a revolutionary new continuous method for acid, caustic, doctor or otherwise chemically treating petroleum distillates such as naphtha, gasoline, kerosine, diesel fuels and furnace oils. The Petreco Electric Process, compared with the treating processes commonly employed in the past, utilizes less equipment, occupies minimum ground space, requires fewer pumps, less operating attention and eliminates the need for mechanical separating devices. Processing is in a closed system; no fumes or air pollutants can escape. Except for the few pumps required, there are no moving parts. Because the operation is automatically controlled with precision devices, the agent (acid, caustic, doctor) requirements are generally less per barrel of oil treated than those of conventional systems.

ELECTRIC
PETROLEUM PROCESSING
DESALTING • DEHYDRATING
SEDIMENT SEPARATING
DISTILLATE TREATING
DESAPONIFYING

PD 55-2

For complete information, call or write

PETRECO

A DIVISION OF PETROLITE CORPORATION
3202 South Wayside Drive, Houston 1, Texas
1390 East Burnett Street, Long Beach 6, California

TAKES THE THROB OUT OF POWER

PENFLEX TUBING

"SOAKS UP" VIBRATION . . . PROVIDES SMOOTHER COOLING OPERATION

WHEN A 16-cylinder, 1,750-hp diesel engine roars into action, the air-cooling and circulation piping really has to "take it." This particular installation performs perfectly because it is equipped with Penflex Flexible Metallic Tubing. A 5-foot length of air-jacketed 14" interlocked Penflex Tubing reaches from exhaust to stack. Its tough, rugged, "seep-proof" construction holds exhausts tight as a pipe . . . yet it is flexible enough to absorb the constant vibration.

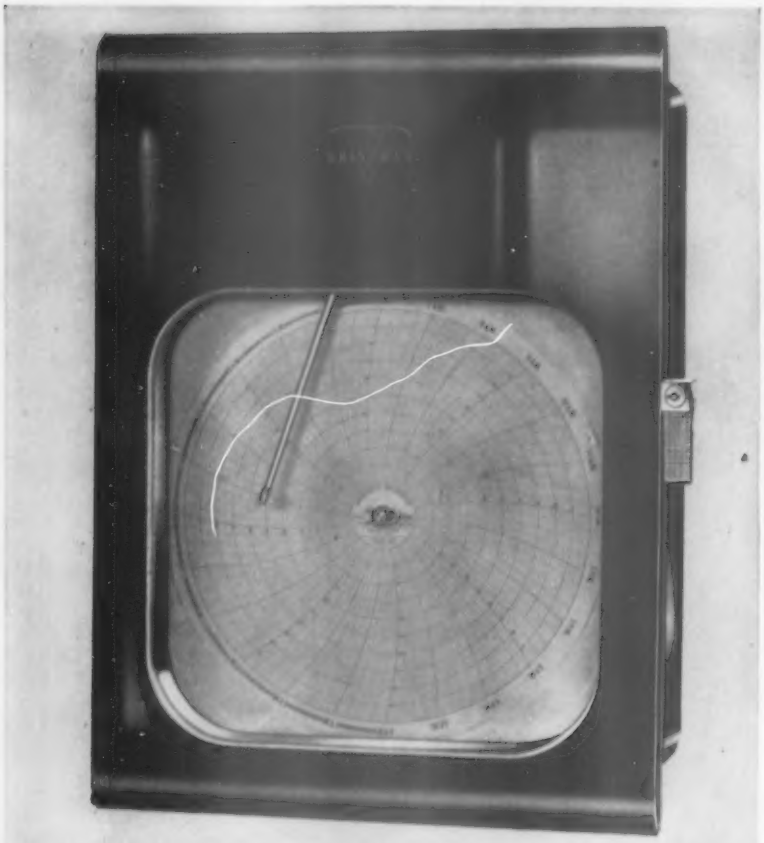
In the power field you have many calls for Penflex—for air and gas lines, for transmission of oil, steam, and liquids. There is a complete line of steel, bronze, and aluminum Penflex Flexible Tubing, Hose and Couplings in sizes from 1/8" to 24" I.D.

Write today for new illustrated data book on "Flexineering"—the science of engineering flexible tubing to your specific job.

Pennsylvania Flexible Metallic Tubing Company, Inc.
7213 Powers Lane, Phila. 42, Pa.
Offices: Boston • New York • Chicago • Houston • Cleveland • Los Angeles

PENFLEX

HEART OF INDUSTRY'S LIFE LINES



EASY-TO-USE BRISTOL RECORDING GAUGES come in pressure ranges from 0 - 0.2 inch of water to 0 - 10,000 psi. Vacuum gauges are available in various ranges from 0 - 30 inches of mercury and absolute pressure gauges in ranges as low as 0 - 6 mm mercury absolute.

Why are more Bristol recording gauges in use than all others put together?

• That's easy — accuracy and dependability are the reasons.

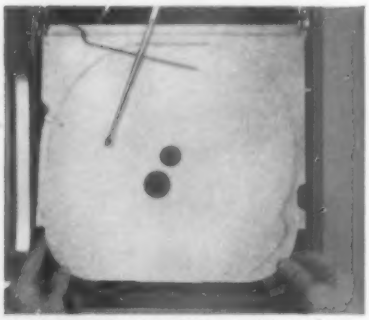
For accuracy, Bristol's measuring elements are unsurpassed. They are the product of 65 years of research and development. Bristol engineers are constantly engaged in developing pressure and vacuum measuring elements of higher accuracy, greater sensitivity, and increased stability.

As for dependability, many Bristol gauges have been in constant operation for more than 40 years — without special attention of any kind!

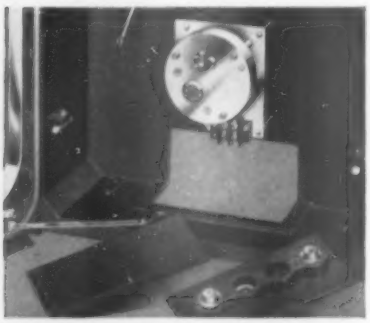
You can get the Series 500 gauge in models designed for recording, controlling and telemetering. Write today for free 32-page Bulletin G621. The Bristol Company, 120 Bristol Road, Waterbury 20, Conn.

Many ranges carried in stock for immediate delivery

LOOK AT THESE "HUMAN-ENGINEERED" FEATURES!



SNAP-ON TYPE CHART PLATE — No tools are needed to remove chart plate. Spring, finger release permits quick access to the space beneath the chart. Plate is easily replaced.



UNIVERSAL CONNECTION BLOCK — Mounting block for instrument connections easily changed from bottom to back of case or vice versa; measuring system can be removed or replaced.

PEN LIFTER — Simple, non-obscuring pen lifter, mounted independently of the chart plate, raises pen from the chart, provides complete freedom for working on instrument with chart plate removed.

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

OIL MEANS INDUSTRIAL DEVELOPMENT

New manufacturing processes . . . new products . . . have come from the development of new uses for oil and its by-products. In the daily job of finding additional oil resources, the Schlumberger Electrical Log . . . the pioneer well logging service . . . has long been recognized as the most important single subsurface exploration method available to the industry.

. . . and Schlumberger means Service

Schlumberger Well Surveying Corp. • Houston, Texas

In Houston...

...there's a complete organization for the design, engineering and construction of plants and facilities for the petroleum, natural gas, chemical, petrochemical, power and allied industries.

The FLUOR *Mid-Continent Engineering Division*

3137 Old Spanish Trail, Houston, Texas

With recourse to engineering, processing, research and construction talent of the entire Fluor organization, The Fluor Mid-Continent Engineering Division is equipped to place men with broad, diversified experience at your disposal. This highly skilled group combines the operational economy of a small well-balanced firm with the facilities, efficiency and financial security of a major corporation – one with national recognition and 64 years of experience.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD
LOS ANGELES 22, CALIFORNIA

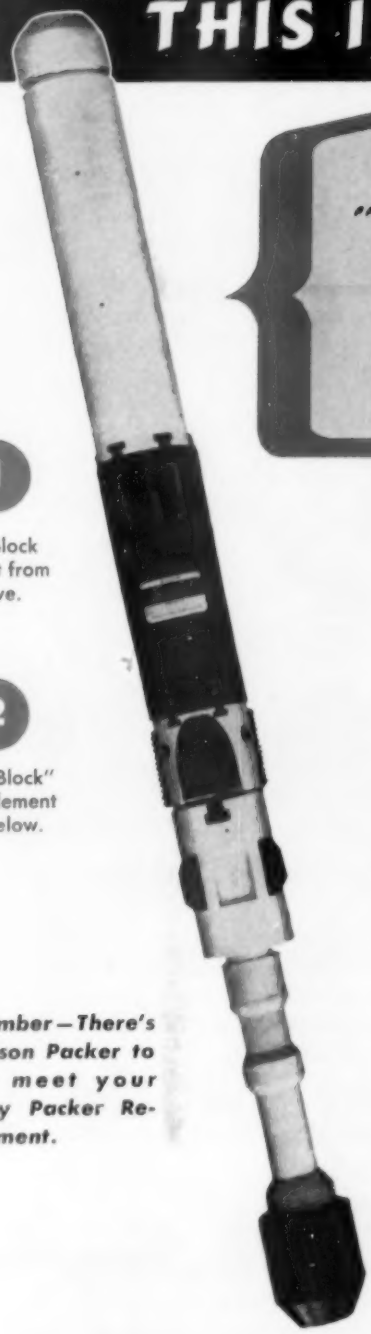
ENGINEERS
CONSTRUCTORS
MANUFACTURERS

NEW YORK
CHICAGO
PHILADELPHIA
BOSTON
PITTSBURGH
SAN FRANCISCO
HOUSTON
BIRMINGHAM
TULSA

IF THE JOB CALLS FOR A HOLD-DOWN PACKER

THIS IS IT . . .

The WILSON "Two-way" Metal Block HOLD-DOWN PACKER



1 Slips Block Element from Above.

2 "Metal Block" Blocks Element from Below.

Remember—There's a Wilson Packer to best meet your Every Packer Requirement.

Here is the safest Packer available today for Fracturing, Acidizing, Dual Completions and Injection wells.

The element is blocked at both top and bottom and cannot possibly cold-flow; you never rupture the casing; and it releases with differntial in the tubing.

The Hold-Down device with its slips is made integral with the upper packer mandrel.

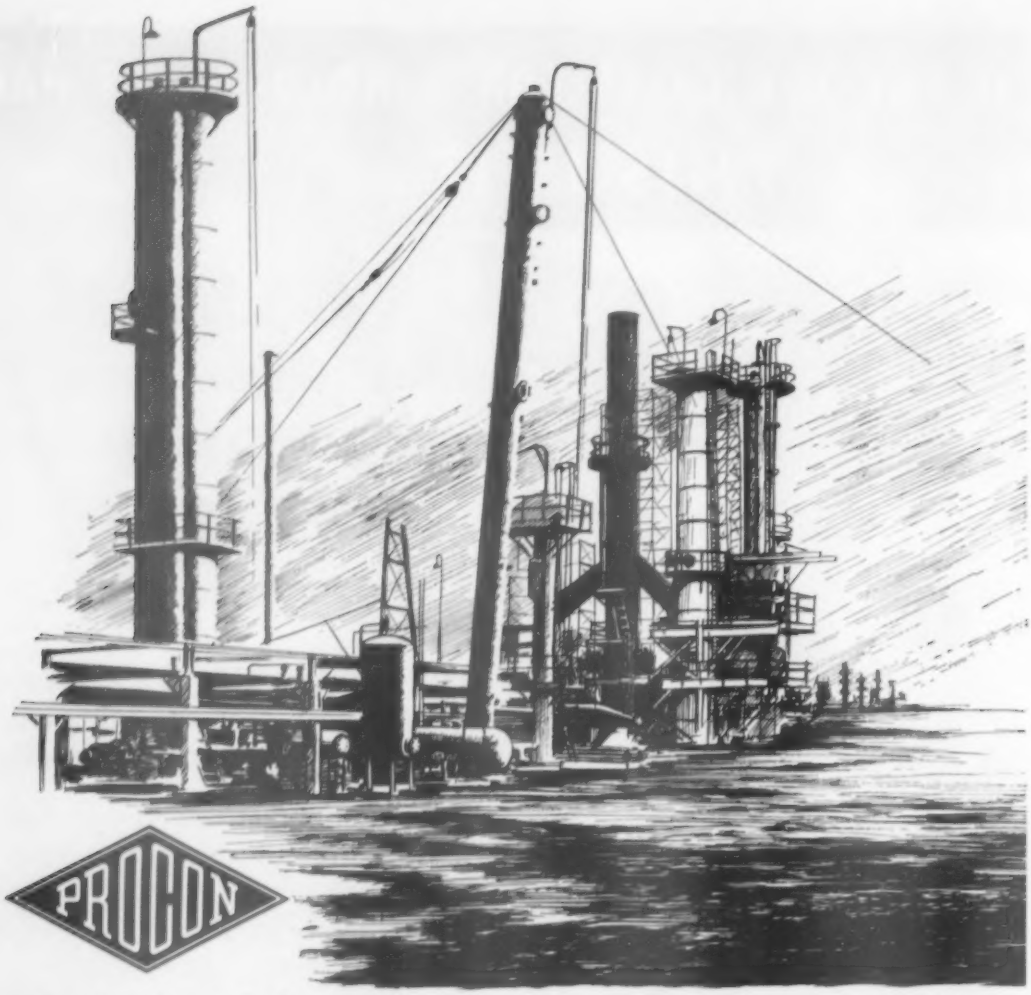
The opening through the entire Packer and Hold-Down Slip mandrel is full tubing size.

This is an outstanding development in Packer design and construction. It will save you time and money to run the Wilson Type "MB", Metal Block, Hold-Down Packer. See your supply store or write—

WILSON FOUNDRY & MACHINE CO.

1417 ELYSIAN ST.

HOUSTON, TEXAS



an acknowledged leader in Process Construction

Procon has every facility for making drawing board designs and quickly transforming them into all types of chemical, petrochemical, or petroleum processing plants. What's more, Procon's ability to do a job fast, accurately, and thoroughly, results in important economies in time and money.

Petroleum processors the world over are recognizing the value of selecting Procon to handle their process construction, regardless of the size or type of job.

Among the many projects which Procon has completed or is currently working on are a complete chemical plant, a complete petroleum refinery, Udex extraction units, UOP Platformers and Fluid Catalytic Cracking units, crude units, polymerization facilities, vacuum distillation equipment, and gas recovery units. In addition, Procon is ready to handle a wide variety of offsite work including boiler plants, cooling towers, oil separators, loading racks, transfer pumping facilities, and instrument and control buildings.

With such a record, petroleum refiners everywhere know that—If It's Process Construction, It's A Job For Procon.

PROCON *Incorporated*

PROCESS CONSTRUCTION

1111 MOUNT PROSPECT RD., DES PLAINES, ILLINOIS, U. S. A.

IN CANADA	PROCON (CANADA) LIMITED 68 YONGE STREET TORONTO 1, ONTARIO
IN ENGLAND	PROCON (GREAT BRITAIN) LIMITED 112 STRAND, LONDON, W. C. 2

Illustration at bottom shows effect of high-velocity turbulently flowing sea water on the inlet end of an Admiralty tube. At the top you see the effect of high-velocity, turbulent flow of sea water around once-lodged pebble or shell in Admiralty tube cooled by sea water.

VELOCITY: how serious tube damage from this cause can be avoided

High velocity is a big factor in causing turbulent flow of the cooling water. This in turn may lead to rapid inlet-end corrosion of condenser tubes, particularly in plants on tide water. You can smooth out the flow of water by using deep water boxes and by flaring the inlet ends of tubes. And you should do away with water obstructions. All these help to increase tube life.

Where a tube is partially blocked by a pebble, shell or other debris, local high velocities can occur. It is highly desirable to prevent the entrance of such material into condenser tubes. But it's not always possible. If you want to avoid serious damage from this cause, inspect and clean tubes frequently.

Velocity is only one factor affecting tube life. Publication B-2, "Anaconda Tubes and Plates for Condensers and Heat Exchangers," discusses *all* the important operational factors, and gives much other useful information. And, of course, our Technical Department stands ready to assist you in the selection of tube alloys from our extensive line. *The American Brass Co., Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.*

53105

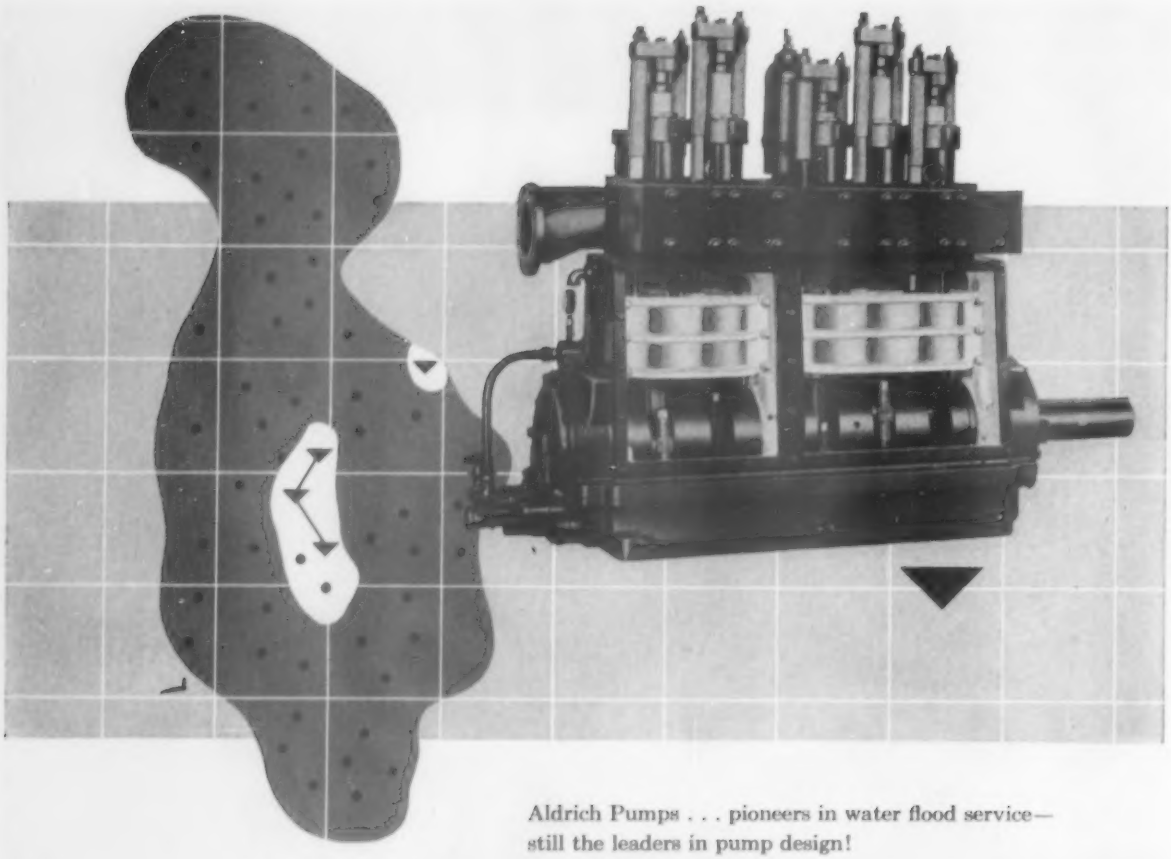
ANACONDA®

Tubes and Plates for

Condensers and Heat Exchangers

Arsenical Admiralty-439; Ambraloy-927; Cupro Nickel, 30%-702; and other copper alloys*

*U. S. Patent No. 2,661,285 (Other)



Get peak water flooding efficiency with ALDRICH field-proven Direct Flow pumps

Aldrich Pumps . . . pioneers in water flood service—still the leaders in pump design!

- *high speed*—greater volume from more compact pumps.
- *low maintenance costs*—KOSMOS Porcelain Plungers and completely sectionalized fluid-ends reduce maintenance, material costs and down time.
- *complete range of sizes*—3″ Triplex, 5″ and 6″ Triplex and Multiplex units permit optimum combinations of pumps with maximum interchangeability of parts.
- *for corrosive service*—fluid-ends available in stainless steel or aluminum bronze.

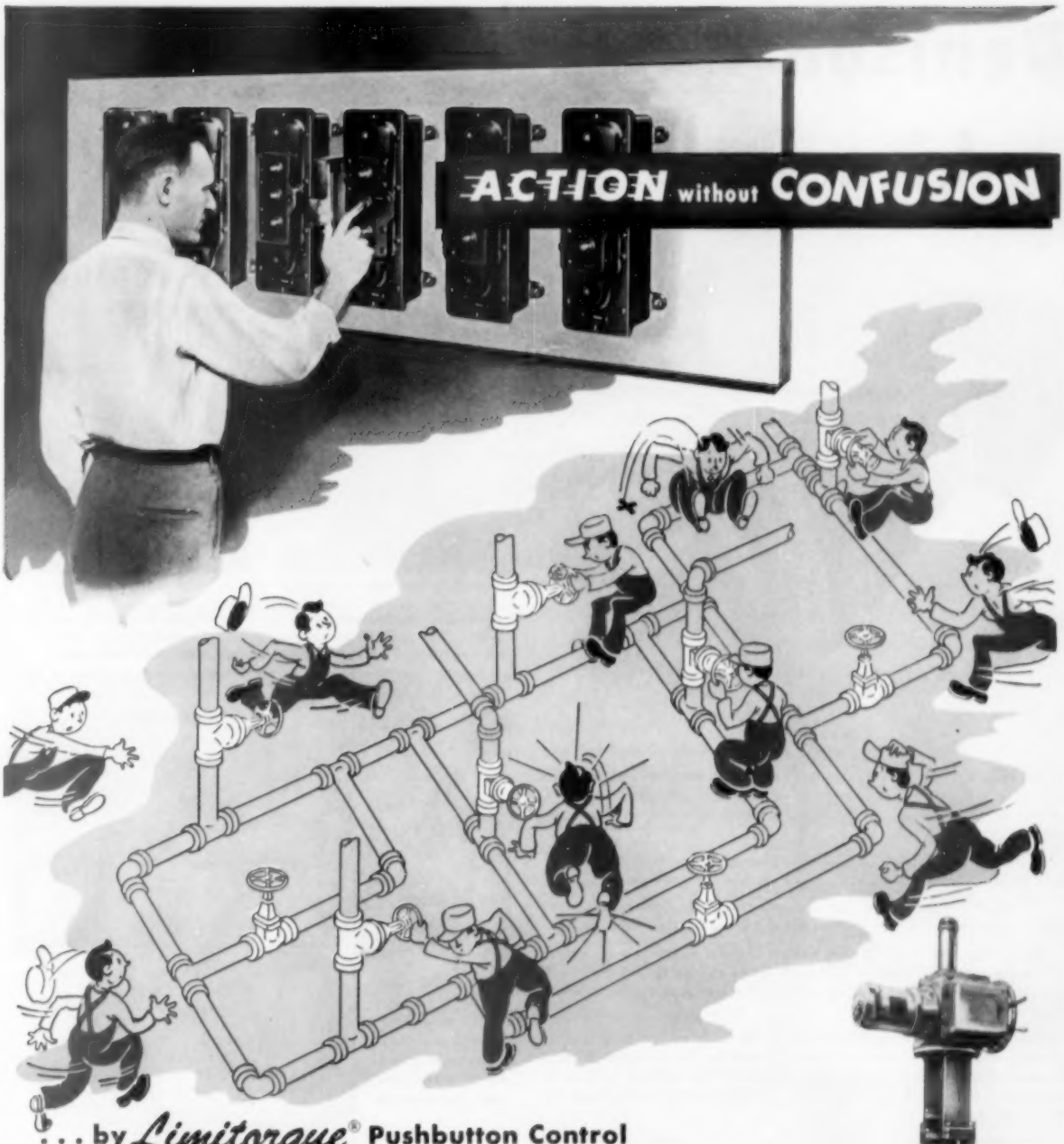
the ALDRICH *pump company*

. . . Originators of the Direct Flow Pump

9 GORDON STREET • ALLENTOWN, PENNSYLVANIA

Representatives: Bushnell Controls & Equipment Co., Inc., 5137 West Jefferson Blvd., Los Angeles 16, Calif. • Cross Pump & Equipment Co., P.O. Box 889, Charleston 23, W. Va. • Lloyd T. Gibbs Co., 1021 Petroleum Bldg., Tulsa 3, Okla. • R. B. Moore Supply Co., Bolivar, N. Y. • Walter Norris Engineering Co., Civic Opera Bldg., 20 North Wacker Drive, Chicago 6, Ill. • Power Specialty Co., P.O. Box 6365, 2000 Kipling Street, Houston 6, Texas; The Suburban Bldg., Room 204, 5526 Dyer Street, Dallas 6, Texas • B. G. Harmon Service & Equipment Co., P.O. Box 309 (Farm Bureau Bldg.), Carmi, Ill. • Stearns-Roger Manufacturing Co., 1720 California Street, Denver 2, Colo. • Export: Petroleum Machinery Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

Direct Flow Spare Parts Stock—at Carmi, Ill., Houston, Los Angeles, Odessa, and Tulsa



. . . by *Limitorque*® Pushbutton Control

Where convenient automatic valve operation is desired, and where valves are inaccessibly located, or where emergency may require *rapid positive operation* from a remote point, LimiTorque is favored for its simplicity and dependability. Just a push of a button starts and stops LimiTorque.

LimiTorque provides complete safety to workmen, by eliminating the need of climbing to high or hazardous locations for manual valve operation . . . and also vitally important, valve operating parts are protected by torque limit switch which instantly shuts off the motor, if foreign obstructions are met during the closing cycle.

LimiTorque may be actuated by any available power source . . . electricity, air, water, gas, or oil.

For complete details about LimiTorque, send for Catalog L-54.

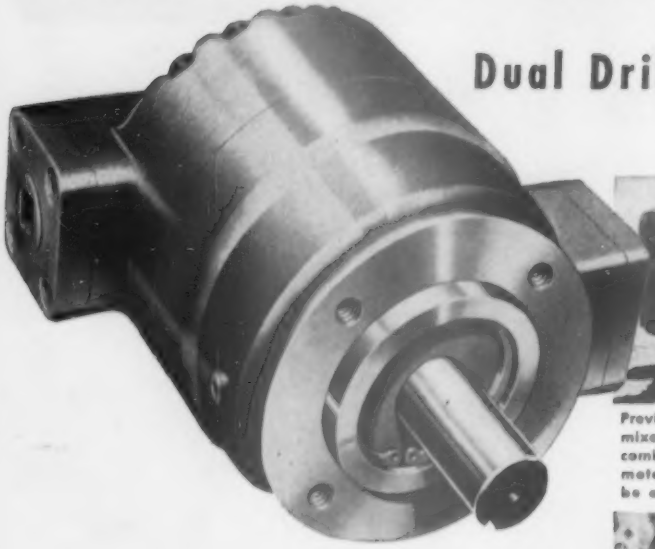
PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears & Speed Reducers

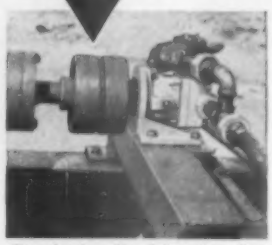
LimiTorque Valve Controls

Denison Pump/Motors drive shale shaker, mud mixer



Dual Drilling Company replaces this with this

Previously the shale shaker and mixer were driven by internal combustion engine and electric motor. The light plant had to be operated day and night.



The hydraulic drive for the same equipment is far less bulky, has few parts, requires little maintenance, relieves light plant of all extra operation.

By switching from an internal combustion engine and electric motor to a compact Denison hydraulic circuit to drive a shale shaker and mud mixer the need for 24-hour operation of the light plant was eliminated.

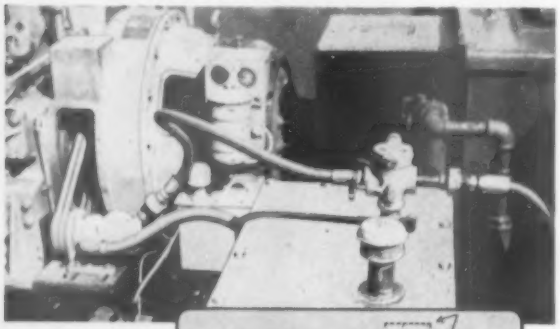
A Denison Pump/Motor, operating as a pump, is driven by V-belt from the power take-off of one of their compounded engines.

Oil from this pump is directed through ¾" flexible hose to another Pump/Motor which acts as a fluid drive for the shale shaker.

The pump also delivers pressure to a third Pump/Motor, which drives the mixer. Either the shaker or mixer can be turned on or off separately by means of plug valves placed across each of the fluid motors.

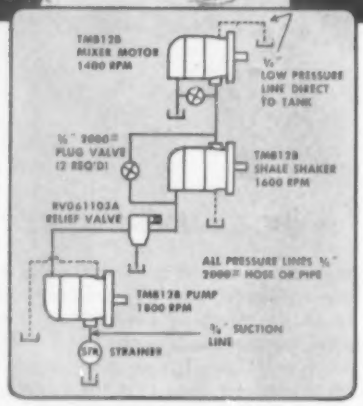
The hydraulic system is also more flexible, easier to operate, quieter, requires less maintenance and was far lower in initial cost. Perhaps the greatest single advantage to this system is that it eliminates the necessity of operating the light plant in order to drive the shale shaker.

The dual-purpose PUMP/MOTOR, which operates as either a pump or motor *without adjustments of any kind*, and in either direction of rotation, is only one example of the advanced engineering featured in Denison HydrOlLic Equipment. Wherever you want *power, pressure or motion* with accurate control, flexibility of application, fully adjustable speed, extra stamina, less bulk — look to Denison HydrOlLic Pumps, Motors and Controls for cost-cutting answers. Write for further details, or call in your nearby Denison Field Engineer. You will not be obligated at all.



Above: Oil lines are ¾" flexible hose, permitting maximum flexibility of arrangement, easy low-cost installation.

Right: Diagram showing how the Denison HydrOlLic components are arranged in the circuit.



DENISON HydrOlLics

PUMPS | MOTORS | CONTROLS | PRESSES

The Denison Engineering Co., 1176 Dublin Road, Columbus 16, Ohio

FACTORIES AND HOME OFFICES . . . BRANCH OFFICES

WEST COAST BRANCH
565 N. Prairie St.
Hawthorne, Calif.
Tel: Osborne 5-3230
(or) Oregon 8-6069

HOUSTON BRANCH
2501 Bartlett St.
Houston, Texas
Tel: JUstin 6232

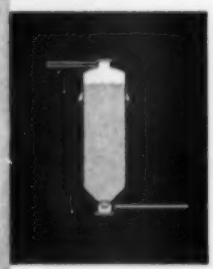
CHICAGO BRANCH
4306 W. 63rd St.
Chicago 29, Ill.
Tel: Reliance 5-7474

NEW ENGLAND BRANCH
273 Broad St.
Manchester, Conn.
Tel: Mitchell 9-1665
(or) Mitchell 3-5107

ATTAPULGUS Fullers Earth

POROCEL Activated Bauxites

...reliable sorptive minerals for petroleum and chemical processing



WANT TO PURIFY BY ADSORPTION?

There's an Attapulgus or Porocel adsorbent to fit your process technique for removing odors, colors, tastes, moisture, acids, sulfur, fluorides and unsaturates from process liquids or gases. Materials treated in principal applications are: motor oils and other lubricating, specialty, and technical oils; petrolatums and waxes; aviation and motor gasoline stocks; kerosene; diesel and heating oils; chemicals and petrochemicals.

HAVE CATALYST OR CATALYST CARRIER NEEDS?

Our sorptive minerals are recognized standards in desulfurization, reforming and isomerization systems—catalytic removal of unsaturates—conversion of sulfides to elemental sulfur—fluid catalyst applications—as catalyst carrier in copper sweetening processes.

WHAT DO YOU WANT TO DRY?

We offer a wide range of reliable, thoroughly proved desiccants for drying air, hydrogen, carbon dioxide, hydrocarbon liquids and gases.

SPECIAL GRADES

Mine and plant facilities permit prompt and economical production of grades meeting individual customer specifications. Our laboratories and technical staffs are ready to assist in research, development, design and operating problems. Your inquiries are invited.

ATTAPULGUS MINERALS & CHEMICALS CORPORATION · **POROCEL** CORPORATION

Dept. V, 210 West Washington Square, Philadelphia 5, Pa.

FIGHT TRUCK FIRES THE NEW AMERICAN-LA FRANCE DRY CHEMICAL WAY

Model PDC-30

When fire hits, these new American-LaFrance Dry Chemical models are ready to stop it. Simply pull pin and squeeze lever. No gadgets to operate, no last minute pressurizing from a gas cartridge or cylinder, no inverting, no bumping, no shut-off nozzle on the hose needed. They're ready to go!

Their fire-smothering efficiency is aided by a scientifically designed Discharge Nozzle which fans the Dry Chemical downward in wide pattern and with great density. Their 150 (plus 25 minus 0) psi. air (or nitrogen) pressure maintains uniform duration of the Dry Chemical discharge pattern.

A glance at valve gauge indicates whether unit is in operating order. When partially operated, the extinguisher can be left standing without loss of air pressure, for use on a possible reflash.

The American-LaFrance Dry Chemical Valve is completely new also. It is ruggedly built. No special tools needed. Contains few parts. Equipped with Safety Relief Valve. Complete valve and siphon tube assembly removes as a single unit for recharging. They're water-tight, and corrosion resistant. Tested for vibration and for operation at temperatures from minus 40° F. to plus 150° F. A Moisture Trap provides for pressurizing with air.

For use on gasoline, oil, grease and electrical fires. Four models from which to choose; PDC-5, PDC-10, PDC-20 and PDC-30. The model numbers indicate the 'pound capacity of the Dry Chemical. Write for free illustrated literature.

Approved by Underwriters' and Factory Mutuals Laboratories for Class B and C fires

OUR 2nd Century of Leadership in FIRE PROTECTION

AMERICAN-LAFRANCE-FOAMITE Corporation

ELMIRA · NEW YORK · U.S.A.

IN CANADA, LAFRANCE FIRE ENGINE & FOAMITE LTD., TORONTO

ALFCO

CANNON PLUGS

give exploration flexibility

...from the air
...on the ground
...under the sea

Modern science has given oil exploration operations a global scope. Probing for oil under mountains, deserts, oceans and jungles demands flexibility of equipment. Such flexibility is inherent in Cannon's vast line of electric connectors... the world's largest and most versatile line.

FOR AERIAL EXPLORATION

For aerial exploration with magnetometers and "flying laboratories" Cannon's K Series provides 3 basic shell designs 1 to 82 contacts and 204 contact layouts. Designed for aircraft uses, particularly on sensitive electronic equipment, Cannon's K Series play a vital role in the success of aerial oil exploration activities.

FOR SURFACE EXPLORATION

For surface exploration over all kinds of terrain and in all kinds of weather, Cannon's XK Series provides the required flexibility for seismometers, amplifiers and dynamic recording equipment. With strong zinc or steel shells, moisture resistant insulation and special Acme thread coupling, the XK Series is well adapted to geophysical exploration.

FOR UNDERWATER EXPLORATION

For handling seismographic circuits under water, Cannon's W Series offers 4 shell designs, from 1 to 52 contacts and 53 layout variations. Featuring heavy brass shells, and special sealing rings, Cannon's Waterproof Connectors perform without fail under the most rugged service conditions.

CANNON ELECTRIC

Since 1915

CANNON ELECTRIC COMPANY, 3209 Humboldt St., Los Angeles, Calif. • Factories in Los Angeles; East Haven; Toronto, Canada; London, England. Representatives and distributors in all principal cities.

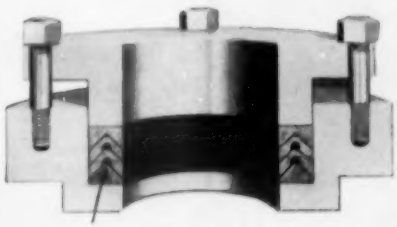
Refer to Dept. 164

CANNON ELECTRIC

Why users prefer CHEVRON* Packing

for rams, plungers, reciprocating rods

1. *Assures a low friction, positive seal*
2. *Lasts much longer, needs less maintenance than ordinary V-type packing*
3. *Works efficiently in a shallow stuffing box*



Note the exclusive hinge-like construction of CHEVRON packing.

Garlock 431 CHEVRON Packing

GARLOCK CHEVRON Packing is entirely different from ordinary V-type packings. With *increasing* pressures CHEVRON rings tighten and prevent leakage; with *decreasing* pressures the packing eases off and permits operation with a minimum of friction.

Service reports, such as those below, prove that CHEVRON packing seals better and lasts longer.

▶ On hydraulic press—40" ram, 6,000 p.s.i., ram honed and chrome plated, gland machined to give clearance of .006" between gland and ram. Garlock 431 CHEVRON size 40" x 41½" x only 2" deep gave 14 years service.

▶ On a machine with hydraulically operated clutches—¾" cylinder, maximum pressure 500 p.s.i., service intermittent, maximum travel ¾". First used cups, then "O" rings, neither of which worked well. Now packed with Garlock 431 CHEVRON ⅝" x ¾" x ½" deep and doing a smooth, positive sealing job.

Ask your Garlock representative to give you all the cost-saving facts about CHEVRON packing, or write for folder AD-115.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N.Y.) • Philadelphia Pittsburgh • Portland (Ore.) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

*Registered Trademark

GARLOCK

PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS
RUBBER EXPANSION JOINTS

R. T. "Bob" Penny, Supervisor in the Mid-Continent and the Rocky Mountain Areas, is typical of IX executives. Having been with the company since 1939, Bob at one time or another has held practically every field job on an IX seismograph crew.

DERRICKS TODAY
Where I.X. Parties Were Yesterday

All Independent Exploration personnel—from the administrative level to working parties—are intimate with the requirements of a successful geophysical survey. This knowledge of field operations was gained in more than 22 years of intensive field work by men who, though now in executive positions, know the importance of a detailed, accurate survey. These men realize the value of prior planning for a survey and when to use time and cost saving "short cuts." This wealth of IX experience will guarantee you a better return from your survey investment.

Independent
EXPLORATION COMPANY
Geophysical Surveys

1973 West Gray, Houston, Texas

Room 8, London Bldg., 620 8th Ave. W., Calgary, Alberta, Canada

39 Victoria St., London, SW 1, England

use

CRUCIBLE REXALLOY balls and seats

for increased pump efficiency — longer life

Barrel pumps equipped with Crucible REXALLOY Balls and Seats last longer, give trouble-free performance between "pulls", under severest operating conditions.

That's because REXALLOY is a nonferrous cobalt-chromium-tungsten cast alloy that has exceptionally high resistance to most forms of wear — abrasion, erosion, friction, corrosion and heat. It's a wise choice for oil well pump ball check valves . . . especially in gassy wells or wells with high sand, acid, alkali or salt water content.

REXALLOY balls, ribbed and flat type seats, ground to American Petroleum Institute specifications, are sold by leading oil well pump dealers and supply houses throughout the country. For greater pump efficiency and fewer replacements on your jobs use REXALLOY ball and seat combinations.

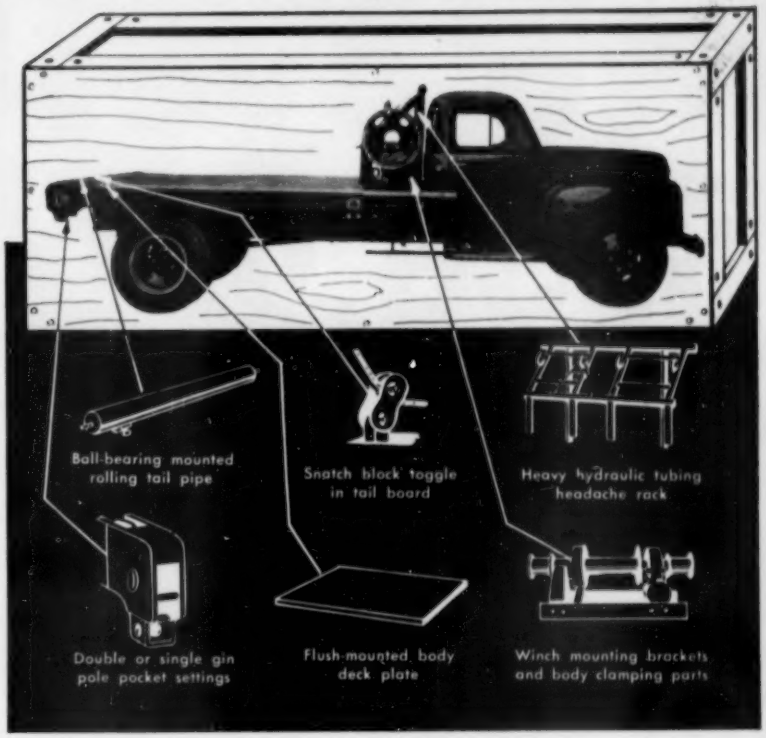
CRUCIBLE

CAST ALLOY STEEL

CRUCIBLE STEEL COMPANY OF AMERICA, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • RESISTAL STAINLESS • ALLOY • MAX-EL • SPECIAL PURPOSE STEELS

The LELAND packaged unit


Ball-bearing mounted rolling tail pipe
Snatch block toggle in tail board
Heavy hydraulic tubing headache rack
Double or single gin pole pocket settings
Flush-mounted body deck plate
Winch mounting brackets and body clamping parts

make your own comparison

Packaged for performance . . . packaged for service . . . packaged for long life, trouble-free operation. The LELAND PACKAGED UNIT, combining two tough pieces of equipment — the Leland Oil Field Truck Body and the heavy duty Tulsa Winch. Throughout the petroleum and pipeline industries the Leland Packaged Unit has been found to be the most versatile piece of truck equipment in the field today. Any job . . . all jobs . . . a real work horse which performs efficiently and safely, reducing equipment down-time, stepping up personnel safety.

WRITE FOR YOUR FREE COPY OF THE NEW BROCHURE "THE LELAND PACKAGED UNIT"

SALES AND SERVICE

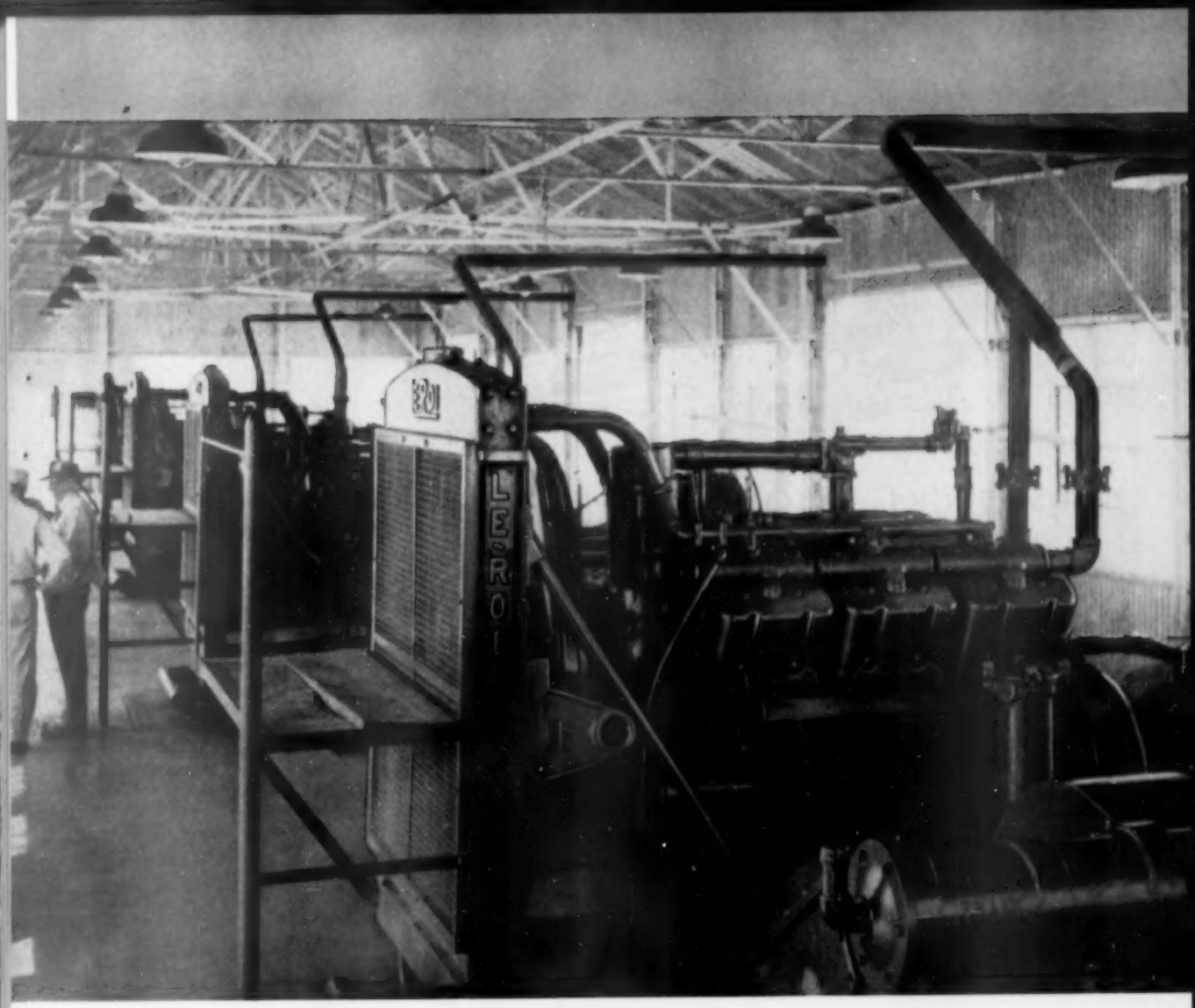
Among the hundreds of items available at the Leland Equipment Company you will find such well known names as: CLEVELAND Trenchers; LORAIN Shovels, Cranes, Hoes; CHICAGO PNEUMATIC Air and Electric Tools, Compressors; TULSA Winches; CMC Pumps, Mixers; BLAW KNOX Clamshell Buckets, Forms, Bins and Batchers; DORSEY Low Bed Heavy Duty Trailers. A tremendous inventory of parts is maintained for your convenience, among which are: CLEVELAND, THEW-LORAIN, CHICAGO PNEUMATIC, and TULSA WINCH.

Leland

EQUIPMENT COMPANY

Oklahoma City • TULSA • Longview, Texas

No overhaul
in 36,900 hours
of continuous
pumping service!
That's the record of one
LeRoi L3000
at pumping station
of major Kansas pipeline



The figures speak for themselves...

Le Roi leads in dependability! Le Roi leads in economy!

If you're interested in cutting your costs for pipeline pumping, here are figures you simply can't afford to ignore:

In the installation pictured above, one of the Le Roi L3000's operated continuously for more than 4 years — under an average load of about 200 hp — before needing overhauling! And then labor amounted to only $373 and parts to only $1578.

A second Le Roi L3000 at the same station operated continuously for 33,615 hours — under the same load — before it had to be overhauled! Labor for the overhaul cost only $476 and parts only $1395.

Now, these aren't isolated cases. In fact, another Le Roi L3000 installed at a different pumping station of this same pipeline company had over 39,500 hours' service and had never been overhauled!

Want to see profitable performance like that at first hand? Ask your supply house or Le Roi distributor to take you around to some Le Roi installations. Have them show you why more and more Le Roi's are being installed for pipeline and other oil-field service.

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio

Oil Field Headquarters: Tulsa Oklahoma

Service as Near as Your Telephone

Complete parts stocks . . .
Skilled mechanics on 24-hour call
. . . Unexcelled overhaul facilities

Oilfield Sales-Service Network

Oklahoma
Le Roi Company Branch—Tulsa.
Carson Machine & Supply Co.—Oklahoma City.

East & South Texas, Gulf Coast
Southern Engine and Pump Company—Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, New Orleans, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co.—Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend.

Rocky Mountain Area
Gehring Equipment Co.—
Casper, Wyoming, Rangely, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation—Shreveport, Louisiana, El Dorado, Arkansas, and Jackson, Clarksdale, Mississippi.

West Coast
Le Roi Engine Sales Co.—
Long Beach, California.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd.—Calgary, Edmonton, Alberta.

P-121

PIASECKI HOOKS ON TO

SAFETY WITH LAUGHLIN

From Thule to Tahiti versatile Piasecki helicopters are building a new tradition of usefulness and dependability. It's the kind of service where equipment has to be right—*all the time*. That's why Piasecki looked to Laughlin as the logical source for the swivel safety hooks used on the end of lifting and rescue cables in both rescue and workhorse helicopters.

These Duronze #3 safety hooks are non-sparking, have silicon bronze spring, bolt and latch, provide 90,000 lbs. ultimate tensile strength/sq. in. and are available from stock. Because the latch locks the load, it *can't* jolt off accidentally.

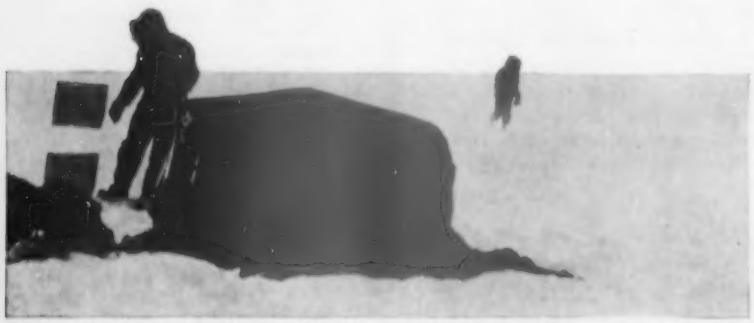
More and more safety- and economy-minded manufacturers are learning that Laughlin is their best source for quality drop forged fittings for wire rope and chain. Over 1500 types and sizes immediately available from stock make ordering easy.

Why not ask your supplier salesman to show you how Laughlin products can help in your business? Or write for new Catalog No. 155.

For Safety's Sake say

LAUGHLIN THE FULL LINE OF WIRE ROPE AND CHAIN FITTINGS

The Thomas Laughlin Company, 513 Fore St., Portland, Maine



"DEL" DESCO SAYS DON'T LET THIS HAPPEN TO YOU!

If lubricants won't stay in your plug valves . . . YOU NEED

DESCO *Plug Valve* LUBRICANTS

It is a fact that DESCO LUBRICANTS stand up where others fail. But before you buy—test them, convince yourself they are all we claim for them.

ONLY 4 DESCO LUBRICANTS HANDLE ALL VALVE SERVICES

No. 600 All-Purpose Hydrocarbon
No. 750 High Temp. Hydrocarbon
No. 650 All LPG Services
No. 400 Acids and Caustics

CONVENIENT STICKS OR BULK

Packed in clean, convenient sticks to fit Delta Gun, or smaller sticks for jack screw lubrication, or in drums for volume lubricators.

DELTA GUN AND FITTINGS

With Delta High Pressure Gun and one-piece double-check fittings plug valve lubrication is 10 to 15 times faster.

Write for Valve Technical FILE

Complete data on lubricant services, conversion charts, and application of Delta-Desco Plug Valve Lubrication Equipment.

DELTA ENGINEERING SALES CO.
804 Louisiana Ave. Shreveport, La.
Sales Offices in All Principal Cities

DESCO
Plug Valve
LUBRICANTS

Texas Petroleum Research Committee Report:

Tennessee Colony Field, Anderson County, Texas

by Frank N. Speller, Jr.

THE Glenrose formations in the East Texas area have excited interest because of the discovery of good gas reserves in such fields as Carthage, Whelan and Trawick. Although the formations are rather tight and thin, the drilling of gas wells on wide spacing has proved to be highly profitable. The per cent recovery of gas from the widely spaced wells has been found to be satisfactory, rarely going below 65 per cent, even under 640-acre spacing.

The same good economics and recoveries do not apply to oil reservoirs discovered in the Glenrose formations. Except in the case of a few fields whose pressures are being artificially maintained, production rarely exceeds 2,000 bbl. per acre, and recoveries are generally less than 20 per cent of original reserves. Since most oil wells are drilled on a maximum of 40-acre spacing, the total number of barrels recovered does not represent an economic return on the drilling investment.

There are 23 such deep lime oil fields producing in the East Texas area, among which is Tennessee Colony field of Anderson County. This field was discovered by the completion of Continental Oil Co. 1 Royall National Bank on November 19, 1949, which was a dual producer in the upper Rodessa and lower Rodessa zones.

The upper Rodessa initially potentialed 108.5 bbl. of 45.5°-gravity oil per day through perforations at 8,865-85 ft. with a gas-oil ratio of 1,855 to 1. The lower Rodessa was perforated from 8,965-90 ft. and was originally classified as a gas well with a calculated daily open flow of 2,800 M.c.f. per day of gas plus 137 bbl. of 58.8°-gravity condensate. Gas-oil ratio was 7,612 to 1.

The Pettit zone was discovered on October 2, 1950, by the completion of the Continental Oil Co. 2 Royall National Bank. It produced from perforations between 9,626-46 ft. and initially potentialed 492 bbl. of 53.4°-gravity oil per day with a gas-oil ratio of 1,747 to 1. The first upper Rodessa was discovered by the completion of LaGrange Petroleum Corp. 1-C I. M. Hughes on March 30, 1951, which was perforated from 8,892-8,900 ft. and potentialed 208 bbl. per day of 48°-gravity oil with a gas-oil ratio of 827 to 1. Most of the wells were acidized with around 3,000 gal.

The field is a local closure on a north-south structural trend limited by a fault on the east side of the field with 200 to 300 ft. of throw and dipping into water on the west side of the field. The north and south sides of the field are limited by porosity and permeability pinchouts. The reservoir rock of the upper Rodessa is described as medium to light grayish brown, crystalline, fossiliferous, oolitic, coquina-like limestone with fine to cellular-type porosity.

The lower Rodessa is described as

Author is petroleum engineer, Tyler, Tex. This discussion is part of T.P.R.C. symposium, Tyler, May 7, 1954.

For dependable water supply at low cost

INSTALL A DEMING VERTICAL TURBINE PUMP

The Deming Vertical Turbine Pump illustrated supplies 450 gallons of water per minute at 75 lbs. pressure for general water supply and processing in an oil refinery. This is one of numerous installations of Deming Vertical Turbine Pumps in the oil and gas industry. Pumps are available for wells from 4 to 16 inches in a complete range of capacities from 15 to 3500 G.P.M. Regularly furnished with unit drive head, other types of drive are available to permit use of most economical sources of power. For complete information on Deming Vertical Turbine Pumps, write for Bulletin No. 4700 and locations of your nearest Deming Distributors.

THE DEMING COMPANY • 559 BROADWAY • SALEM, OHIO

DEMING pumps

FOR THE OIL AND GAS INDUSTRY

New PITT CHEM Fills Big Gap in

First Enamel Formulated to Withstand High Line Temperatures on Pressure Side of Pumping Stations

HERE'S one of the most important new products ever developed for the protection of pipelines. It's Pitt Chem Hotline Enamel, a tar base coating specifically designed to protect more completely against the high temperatures now known to prevail on up to one-third of the length of most gas transmission lines.

Recent field tests indicate that temperatures as high as 180° F. are developed on the pressure side of gas pumping stations . . . with temperatures as high as 120°F. even 20 miles from the station.

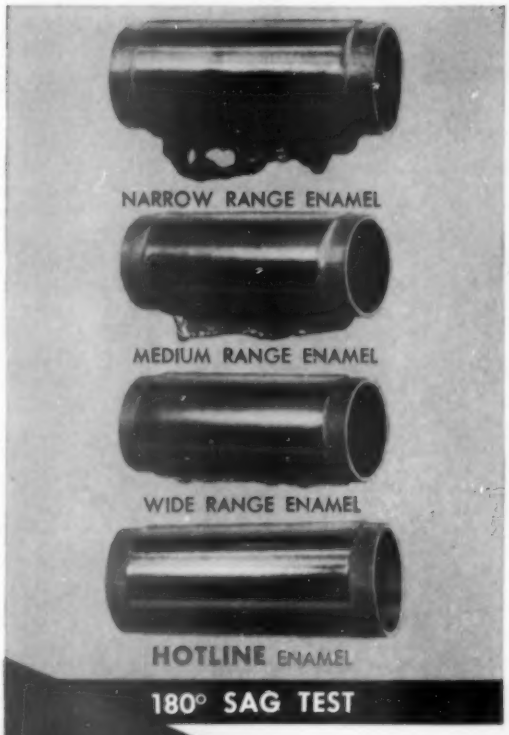
These temperatures can have several important effects on pipeline enamels. They can cause them to sag or flow off and expose the pipe, or to become so soft that soil stress and pressure can cause penetration of the enamel, resulting in apparent low coating resistance.

Even with these high temperature characteristics, the minimum softening point of Pitt Chem Hotline Enamel is only 240° F. The new enamel has less tendency to cold flow than any other coal tar coating. This quality, combined with its exceptional hardness and non-flow characteristics, indicates that a much higher resistance to soil and pressure stresses can be expected with Pitt Chem Hotline Enamel.

Pitt Chem Hotline Enamel is ideal for the following applications: On gas pipelines where service temperatures are above 100° F. In areas where excessive soil stress conditions prevail, or where the backfill and trench are rough, full of stones and rough objects which normally penetrate softer coatings. On all types of pipelines where ground temperatures are high most of the time.

For more information on this revolutionary advance in pipeline protection, call or write today for free Pitt Chem Hotline Enamel brochure.

HOTLINE Enamel Pipeline Protection

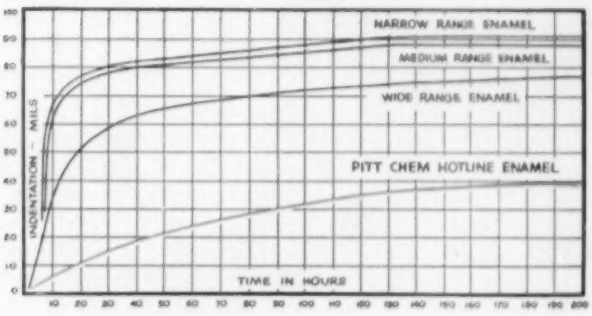


Proof of HOTLINE'S Resistance to sagging at high temperatures

These are actual pictures of sections of pipe coated with four different grades of pipeline enamel. These sections were exposed to 180° F. sag test temperatures. Note that only Pitt Chem Hotline Enamel resisted sagging.

Proof of HOTLINE'S Superior Resistance to soil stress damage

The chart below shows the degree of penetration that occurs when the three popular grades of enamel and Hotline are subjected to a pressure of five pounds psi. and tested over a period of 200 hours at 120° F. Pitt Chem Hotline Enamel's resistance to penetration is almost twice as great as any of the other three grades.



Cold Flow of Bituminous Coatings
Indentation by ½" D. Rod, 120° F., 5 psi Load

PROTECTIVE COATINGS DIVISION
PITTSBURGH COKE & CHEMICAL CO.
Grant Building - Pittsburgh 19, Pa.

W&D 8140

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

tan to graying brown, crystalline to dense, fossiliferous, oolitic to pseudo-oolitic, slightly argillaceous limestone with fine to cellular-type porosity containing some streaks of dark grayish brown, dense, nonporous limestone. The Pettit is described as grayish brown to tan, crystalline to dense, very fossiliferous, oolitic, fractured limestone, fine to medium porosity.

A cross-section of the Rodessa producing zone of the Tennessee Colony reservoir shows a fault plane, the field being on the upthrow side of the fault. At its highest position, the first upper Rodessa appears at 8,460 ft. subsea, the upper Rodessa at 8,480 ft. subsea, and the lower Rodessa at 8,560 ft. subsea. There is a rather abrupt dip on the west side of the field, with the lower Rodessa oil-water contact shown to be 8,690 ft. subsea in the McBee-Carroll well. The average oil-water contact for the field is some higher than this and is estimated to be 8,675 ft. subsea. The first upper and upper zones were originally classified as oil zones. Although the lower Rodessa zone is also classified as oil, there is generally considered to be a gas cap on top of the oil, the gas-oil contact being 8,610 ft. subsea.

Thin formations . . . In the first upper Rodessa formation, maximum thickness is 6 ft. on the crest of the structure. This zone is limited on the east side of the field by the fault and pinches out to zero feet in all other directions. It contains 13 producing wells on 1,200 productive acres of which there are 561 proration acres, with an average net effective producing section of 2.67 ft. Original oil in place is estimated to be 1,667,000 bbl. All of these wells were dual producers originally and flowed their oil through the casing, the lower zone being produced through the tubing.

Original bottom-hole pressure of the first upper Rodessa zone was measured to be 4,650 psi. and has decreased by a cumulative oil production of 409,530 bbl. to its present pressure of 1,712 psi. It is interesting to note that this pressure decline has leveled off during the past year as a result of reduced withdrawals and a possibility of pressure support through leaks between the zones.

Gas-oil ratios have increased from an original ratio of 850 cu. ft. per barrel to a present ratio of 14,199 cu. ft. per barrel. Daily oil production reached its maximum of 875 bbl. per day in early 1951 and is stabilized at 190 bbl. per day at the present time. Cumulative gas production is 2,055,447 M.c.f.

Estimated ultimate recovery has been calculated to be 496,000 bbl. This represents 413 bbl. per acre, or 155 bbl. per acre-foot. There is a rather even bottom-hole-pressure distribution pattern throughout the field.

Upper Rodessa . . . The upper Rodessa zone covers a larger areal extent than does the first upper Rodessa zone and the maximum sand thickness is 12 ft. It contains seven producing wells with the wells being principally located in the south end of the field. Consequently only a small fraction of its 1,970 productive acres is being drained.

Average net effective producing section is 3.74 ft. Original oil in place is estimated to be 3,336,000 bbl. All of these wells are dual producers. Original bottom-hole pressure was measured to be 4,650 psi. and has decreased through a cumulative production of 222,031 bbl. to its present pressure of 2,531 psi. Like the first upper Rodessa zone, pressure decline has leveled off during the past year.

Gas-oil ratios have increased from 1,800 cu. ft. to a present ratio of 16,582 cu. ft. per barrel. Daily oil production reached its maximum of 250 bbl. per day in 1950 and is stabilized at 40

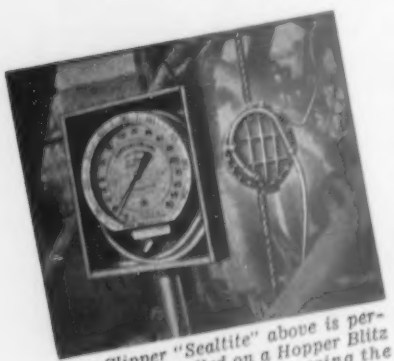
Rugged and Handy For Small Rigs!

MARTIN-DECKER

Production Model

Clipper "Sealtite" Weight Indicators

A Martin-Decker Production Model Weight Indicator Gauge can be placed anywhere you want it—at the brake, in front of the driller, over next to the line permanently attached to the mast where it can be seen by the driller—without danger or damage from dead line vibration or whip, and with it you can read your loads with precision in pounds. Equipped with supersensitive Vernier for maximum sensitivity and readability. Vacuum loaded at the factory and permanently sealed. Easy to install and move. No adjusting, no pumping.



The Clipper "Sealtite" above is permanently installed on a Hopper Blitz trailer-mounted rig. Lowering the mast and moving in no way interferes with this installation.

- RUGGED AND DEPENDABLE
- KEEPS GAUGES OFF DEAD LINE
- PERMANENT INSTALLATION
- EASY VISIBILITY
- ELIMINATES DEAD LINE WHIP
- LASTS LONGER

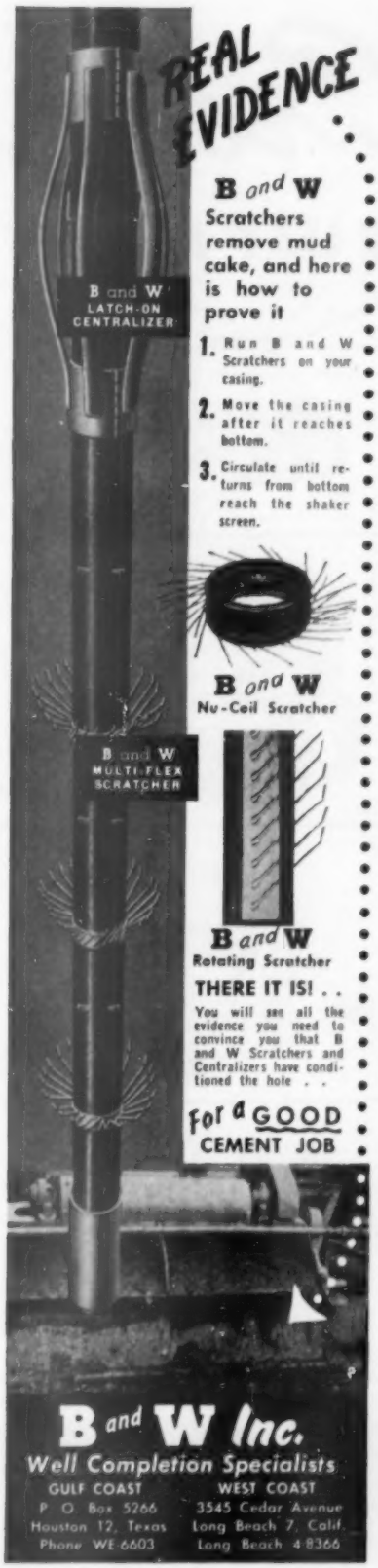
Install your Clipper Production Model permanently on your mast and forget it. It's there when you set up, when you tear down, and when you move.

MARTIN DECKER CORP.

HOME OF THE WEIGHT INDICATOR

LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: T. I. CULLEN, BAKERSFIELD, CALIFORNIA
MID-CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS
CANADIAN DISTRIBUTOR: REED ROLLER BIT COMPANY OF CANADA, LTD., CALGARY & EDMONTON, ALBERTA



B and W
Scratchers remove mud cake, and here is how to prove it

1. Run B and W Scratchers on your casing.
2. Move the casing after it reaches bottom.
3. Circulate until returns from bottom reach the shaker screen.

B and W
Nu-Coil Scratcher

B and W
Rotating Scratcher

THERE IT IS! . .
You will see all the evidence you need to convince you that B and W Scratchers and Centralizers have conditioned the hole . .

For a GOOD CEMENT JOB

B and W Inc.
Well Completion Specialists

GULF COAST	WEST COAST
P. O. Box 5266	3545 Cedar Avenue
Houston 12, Texas	Long Beach 7, Calif.
Phone WE 6603	Long Beach 4-8366

this new crude oil distillation heater

fired with the famous
NATIONAL AIROIL
OIL-GAS TANDEM BLOCK COMBUSTION UNITS

. . . MEANS MANY MORE HOURS ON STREAM WITHOUT SHUTDOWN

This heater (RJ Oil & Refining Co., Inc., Princeton, Indiana) is fired from each end with one of NATIONAL AIROIL's #2 combination oil and gas, patented, Tandem Block Combustion Units.

The Tandem Unit is always fired with NATIONAL AIROIL Combination Oil and Gas Burners . . . has a high turndown ratio with a steady flame . . . maintains required temperature using either fuel . . . radiates heat uniformly without tube impingement. With the Tandem Unit's clean flame, a cold furnace can be brought to full capacity in a shorter time.

You will realize more satisfaction from YOUR heaters when NATIONAL AIROIL Tandem Combustion Units are specified.

NATIONAL AIROIL BURNER CO., INC.

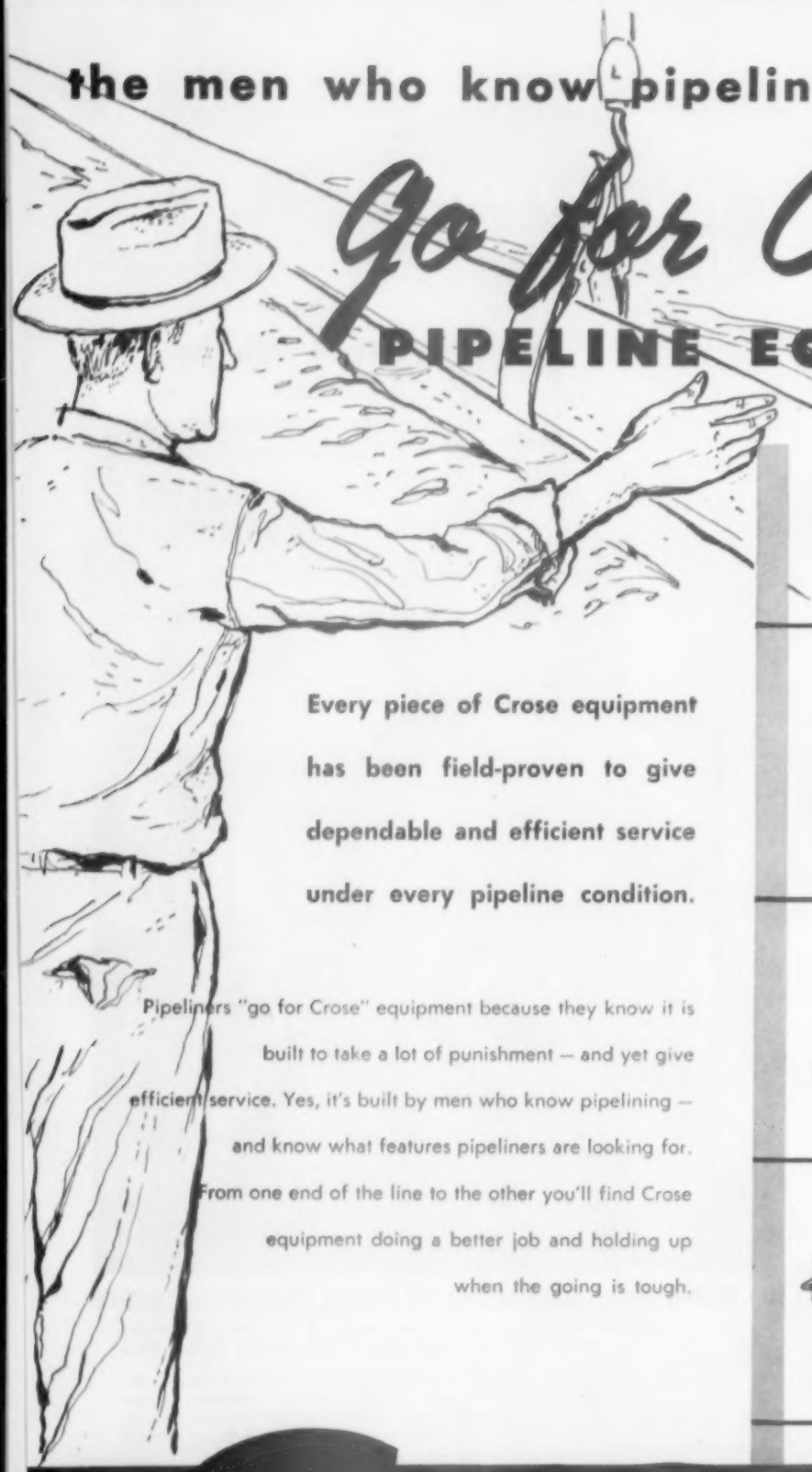
CHEMICAL-PETROLEUM DIVISION
1236 EAST SEDGLEY AVE., PHILADELPHIA 34, PA.
Southwestern Division: 2512 South Boulevard, Huston 6, Texas

INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

the men who know pipelining best . . .

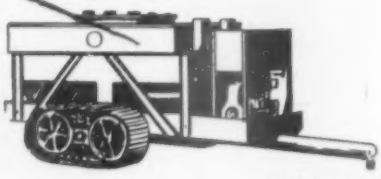
Go for Crose

PIPELINE EQUIPMENT

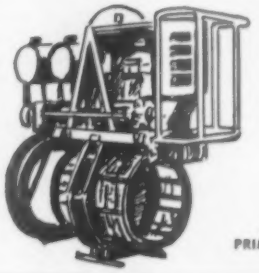


Every piece of Crose equipment has been field-proven to give dependable and efficient service under every pipeline condition.

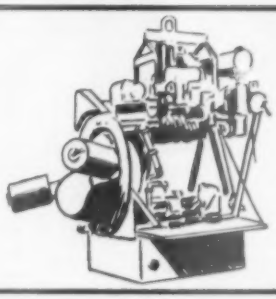
Pipeliners "go for Crose" equipment because they know it is built to take a lot of punishment — and yet give efficient service. Yes, it's built by men who know pipelining — and know what features pipeliners are looking for. From one end of the line to the other you'll find Crose equipment doing a better job and holding up when the going is tough.



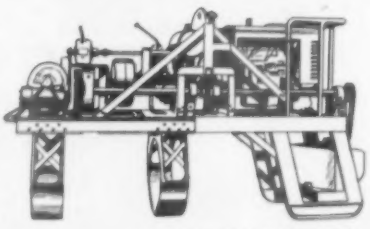
CROSE-LITTLEFORD PIPELINE KETTLES



CROSE CLEANING & PRIMING MACHINES



CROSE COATING & WRAPPING MACHINES



CROSE ROAD BORING MACHINES

CROSE

Manufacturing Company, Inc.

2716 DAWSON ROAD • TULSA, OKLAHOMA • U.S.A.

bbl. per day at the present time. Cumulative gas production is 1,749,157 M.c.f.

Extrapolating production decline curves yields total primary production of 378,000 bbl. This represents 192 bbl. per acre or 51 bbl. per acre-foot for this zone. Bottom-hole-pressure maps of the upper Rodessa zone indicate pressures to be 2,531 psi., 820 psi. higher than the first upper Rodessa zone.

Lower Rodessa . . . Maximum thickness of the lower Rodessa formation is 40 ft. in the center of the field. As stated earlier, this zone contains a gas-cap area. The lower Rodessa is the most important of any producing zone in the field and contains 47 producing wells on 2,800 acres with a net effective producing section of 19.0 ft. Original oil reserves are estimated to be 10,154,000 bbl. Original gas-cap reserves were 54.8 billion cubic feet. Most of the wells are duals into other formations and a majority flow their oil through the casing.

Original bottom-hole pressure was measured to be 4,675 psi. and has decreased through a cumulative production of 1,256,679 bbl. oil and condensate to its present pressure of 2,888 psi. Original gas-oil ratio is indicated to be 7,500 cu. ft. per barrel. The ratio has decreased as flank oil wells were completed and reached a low of 2,941 cu. ft. per barrel in 1951. Present gas-oil ratio is 10,132 cu. ft. per barrel.

Daily oil production reached a maximum of 1,650 bbl. per day in late 1951; it is stabilized presently at 800 bbl. per day. Gas production is presently 6,097,556 M.c.f. It is estimated that the zone will recover 1,401,000 bbl. of oil and 1,450,000 bbl. of condensate under primary production. This represents an over-all recovery of 1,018 bbl. per acre, or 53.6 bbl. per acre-foot.

In the lower Rodessa zone on January 1, 1954, bottom-hole pressure was measured to be 2,887.7 psig., a decrease of 100.8 psig. from the previous survey in June 1953.

Pettit zone . . . Maximum thickness of the Pettit formation is indicated to be 11 ft. This zone is not completely developed as yet in the north end of the field. It presently contains 41 producing wells on 3,200 acres with an average net effective producing section of 4.55 ft. Original oil reserves are estimated to be 6,229,000 bbl. Most of the wells are dual producers with one of the Rodessa zones and flow their oil through the tubing.

Original bottom-hole pressure was measured to be 5,300 psig. and has declined at a rather rapid rate to its present pressure of 1,758 psig. Daily oil production reached its maximum of 1,850 bbl. per day in early 1952, but has declined at the present time to 800 bbl. per day. Cumulative oil production was 1,330,834 bbl. on January 1, 1954. Gas production has been 6,845,000 M.c.f.

An extrapolation of the decline curve permits the conclusion that 1,620,000 bbl. would be produced by primary production, an amount equal to 506 bbl. per acre, or 111 bbl. per acre-foot. Bottom-hole pressures in this zone in most parts of the field have decreased to a point that wells are incapable of producing their full allowables. In several cases the wells have been taken off production because of their inability to flow.

To summarize, these four reservoirs originally contained 21,386,000 bbl. of oil. Their primary recovery, by the operating methods now being used, will be 3,895,000 bbl. of oil, or 18 per cent of their in-place reserves. This represents approximately 1,400 bbl. per acre or 95 bbl. per acre-foot. This recovery is lower than the value generally assigned this type reservoir because it is based on the entire reservoir rather than just the developed area. Together with this oil will be produced 1,450,000 bbl. of condensate from the lower

SEE FOR YOURSELF—Next time try a

FORT WORTH QD SHEAVE

EASY ON-
EASY OFF
WITH POSITIVE
PRESS FIT!

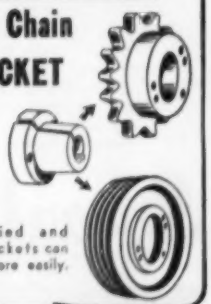
The Fort Worth "QD" Sheave with interchangeable hub is easily and quickly installed and removed. You get a positive press fit all the way around the shaft eliminating wobble and eccentricity found in old style sheaves. Here's the job tested, precision-engineered hub and sheave that is used throughout industry for transmitting power.

Your oil field supply house can supply you with prompt shipment from the nearest Fort Worth Warehouse, giving your order prompt delivery—keyed to oil field requirements.

Be sure to ask for Fort Worth "QD" Sheaves.

Catalog explaining additional advantages and construction details will be furnished on request.

"QD" HUB
ALSO FITS
FORT WORTH
Roller Chain
SPROCKET



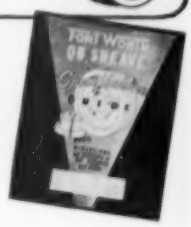
Speed
Changes
are simplified and "spare" sprockets can be carried more easily.

FORT WORTH STEEL AND MACHINERY CO.

Dept. 275, 3600 McCart Street,
FORT WORTH, TEXAS

BRANCH WAREHOUSES & SALES OFFICES:
LOS ANGELES — KANSAS CITY, MO.
HOUSTON, TEX. — CHICAGO, ILL.
MEMPHIS, TENN. — ST. LOUIS, MO.
ATLANTA, GA. — JERSEY CITY, N. J.
SAN FRANCISCO, CALIF.

Send for copy of "QD" SHEAVE Specification Guide No. 81



Rodessa gas cap or about 25 per cent of the original condensate in place. There will also be produced roughly 80 billion cubic feet of gas from all zones.

Sinclair Pipe Line Co. is the principal oil purchaser in the field. Lone Star Gas Co. purchases the gas. At the present time some gas is being flared from wells that cannot buck Lone Star's line pressure. According to Railroad Commission schedules there are 106 allowable wells owned by 15 operators, none of which controls more than 25 per cent of the field. Five of these are major companies, the remainder independents.

High shrinkage . . . All of the oil found in the various zones exhibits the peculiarity of having a very high shrinkage factor, averaging ½ bbl. of oil into the stock tank for each barrel of oil in the reservoir. Because of the decrease in reservoir pressure due to depletion, about two-thirds of the total shrinkage has already taken place.

The gas-cap area of the lower Rodessa is estimated to have originally contained 54,839 M.M.c.f. of gas. This gas was rather rich in condensate, being measured at 105 bbl. per million. Retrograde condensation losses were also extremely high. The liquid content of this gas decreased to 30 bbl. per million with reduction in reservoir pressure.

Effort to Achieve Maximum Oil Recovery

The first Railroad Commission order in this field was issued on February 1, 1951. This order established 40-acre spacing for the lower Rodessa and upper Rodessa zones. In spite of the known gas cap, the field was classified as oil throughout and was prorated upon a factor using 50 per cent of the allowable production to the well and 50 per cent to acreage. The gas-oil ratio limit was 2,000 to 1. This same rule was extended to the Pettit and first upper Rodessa on December 12, 1951.

Although it was evident at an early date that only a small fraction of the reserves could be recovered from the various zones in the field, the 40-acre drilling pattern plus the habit of "clustering" wells close to one another within each 40-acre unit retarded extension of the field.

It was not until July 1952 when the field reached about 80 per cent of its presently developed stage, that pressure maintenance was explored as a method of improving oil recovery. At this time, one of the operators in the field asked for a hearing to seek the Railroad Commission's permission to maintain pressure in the first upper Rodessa zone, stating that oil production could be increased from 382,466 bbl. to 549,112 bbl. by such an operation by an equipment investment estimated at $100,000.

The operator stated in the hearing that his object was to demonstrate the benefits to be gained by such an operation in this relatively small zone with the purpose in mind of interesting operators in all other zones in undertaking similar projects. One of the operators protested this hearing on the grounds that the economic returns were not sufficient to warrant the action.

The hearing had the good effect, however, of acquainting the operators generally with the fact that oil recoveries could be materially improved by pressure maintenance. Therefore soon after the Railroad Commission entered an order in September 1952 approving pressure maintenance of the first upper Rodessa, an operators' meeting was called to investigate the possibility of field-wide pressure maintenance. A field-wide study was authorized at the meeting. A geological committee prepared sand-thickness maps and an en-

NOW

Spray it Clean with KELITE SPRAY WHITE and this money-saving KELITE SPRAY GUN

This amazing patented* super-cleaner removes...grease, oil, wax, gum, dirt, dye, ink, soap, light carbon.

SPRAY WHITE does its work with complete safety...free from heat, odor, fumes, solvents, fire-hazard, or danger to skin.

This remarkable chemical compound, when used according to directions, is safe on all metals, plastics, rubber, porcelain, composition, or wood.

Send for list of 200 leading American companies who have bought Kelite Spray White, and Kelite Sprayers (200 in use in one plant). Thousands of companies are saving time and money, and keeping premises and equipment sparkling clean, with this exclusive and patented Kelite development.

THE KELITE SPRAY GUN is rugged—easy to use. Polyethylene container is light, shatter-proof, holds 1 pint liquid. Send for complete description.

Spray White made by KELITE®

MAIL TODAY

KELITE PRODUCTS, INC.
1250 North Main Street, Los Angeles 12, California
___ Mail free Spray White literature and list of prominent users.
___ Request free demonstration of Kelite Spray White.
NAME
COMPANY
STREET
CITY

Service Offices in 98 American Cities and 16 Countries Abroad
PLANTS IN LOS ANGELES BERKELEY HEIGHTS, N.J. CHICAGO DALLAS MEXICO CITY

* U.S. Patent No. 2,381,124

RAISE JOB SAFETY!

USE GENUINE

CROSBY CLIPS

your

"SYMBOL OF SAFETY"

When you see the Crosby Clip's Red "U" Bolt, you know the "job is safe!" Made of drop-forged steel and hot-dip galvanized, there's an *extra margin of safety built in!* Insist on genuine Crosby Clips—available in all sizes.

Wherever you are, there's a Crosby Clip distributor.

LOOK FOR THE

Crosby Products

Division of

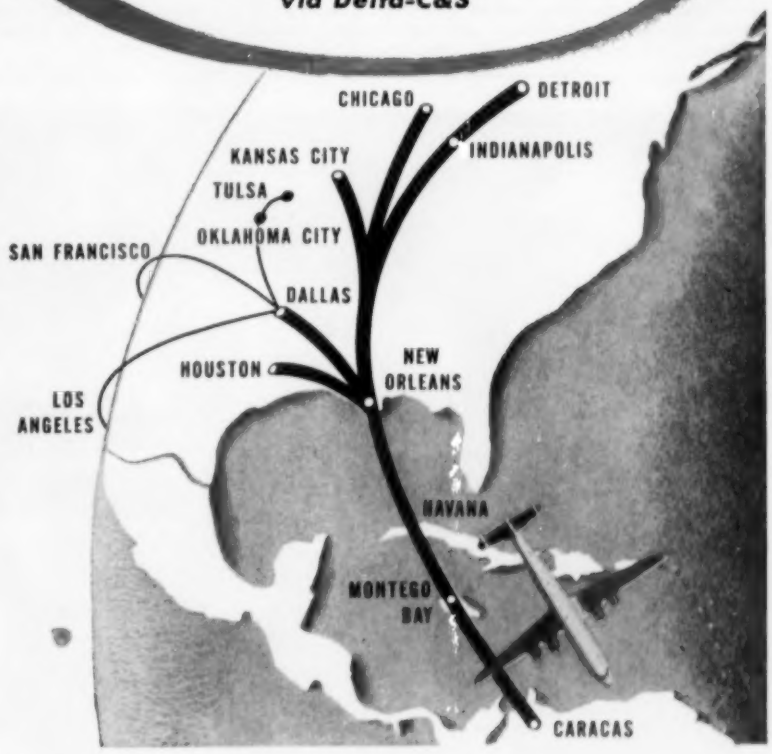
American Hoist & Derrick Co.

St. Paul 1 • Minnesota

Every Major U.S. Oil Center is

Within 24 hours of Venezuela

via Delta-C&S



Through-plane service from the West Coast to New Orleans,* fast connections from Oklahoma, express Constellations straight through from Chicago—all coordinated to land you in booming Caracas first thing in the morning.

There's a 300 mph Luxury Constellation every evening from New Orleans at 7:25 with complimentary refreshments and a special French Quarter dinner. Stops at Havana and Montego Bay, Jamaica.

**Delta-C&S and American Airlines interchange service*

Fastest—Most direct from: HOUSTON DALLAS—NEW ORLEANS SHREVEPORT CHICAGO—ST. LOUIS

Delta-C&S AIR LINES

. . . the oilman's route to Caracas!

General Offices: Atlanta, Georgia

Ticket offices in: LOS ANGELES, DALLAS, HOUSTON, TULSA, TYLER, KILGORE, SHREVEPORT, NEW ORLEANS, CHICAGO

gineering committee was given the job of determining the feasibility of the project. This committee submitted a report to the operators on November 6, 1952, which read:

"The engineering committee has studied the increase in recoveries of oil and condensate by pressure maintenance by gas injection in the lower Rodessa reservoir of Tennessee Colony field. This study has been in progress over a 2-month period and has been performed principally by reservoir engineers of Continental Oil Co., Humble Oil & Refining Co., and The Texas Co. Other members of the committee have participated in some phases of the work and all members of the committee have discussed the results. Following are various companies' estimates of per cent recoveries under primary and pressure maintenance conditions of operation:

	Continental	Humble	Texas
Primary, per cent	17.0	16.3	13.6
Pressure maintenance, per cent	29.8	29.3	33.0

"Continental and Humble used a solution gas drive with expanding gas-cap calculation, and The Texas Co. used a frontal advance-type calculation. The committee adopted the Humble value as a minimum reasonable expected recovery figure since the increase calculated by Humble practically coincides with Continental's calculation. Using this value, the additional oil attributable to pressure maintenance is 1,197,000 bbl.

"Regarding additional condensate recoveries, the committee adopted as minimum reasonable recovery the amount of condensate saved from future retrograde loss by maintenance of pressure in the gas cap. The recovery is regulated by phase-behavior calculations modified by conformance factor. The increase so calculated amounted to 738,000 bbl.

"The net value of additional oil and condensate recoveries was $1.70 and $1.90 per barrel respectively after deducting royalties, taxes, and lifting charges, and the total value of additional recoveries is calculated to be $3,437,000. Total cost of equipment and operations for a compression plant to maintain pressures by gas injection is $1,500,000. Based on the above minimum reasonable values, the net profit from the lower Rodessa is $1,937,000, and the project appears to be feasible. The committee recommends the unitization of the lower Rodessa for pressure maintenance.

"Certain other possibilities for additional recoveries to that stated above ought to be investigated. The most important of these is the possibility of revaporizing condensate already lost in the reservoir because of decrease in bottom-hole pressures, and additional recovery of oil by vaporization of the more volatile ends after normal displacement recoveries. These would both be accomplished by careful regulation of pressure at values determined in laboratory experiments which have not as yet been conducted. Since the committee has no data to work with, they are unable to state benefits. It is reasonable to believe that these benefits will exist.

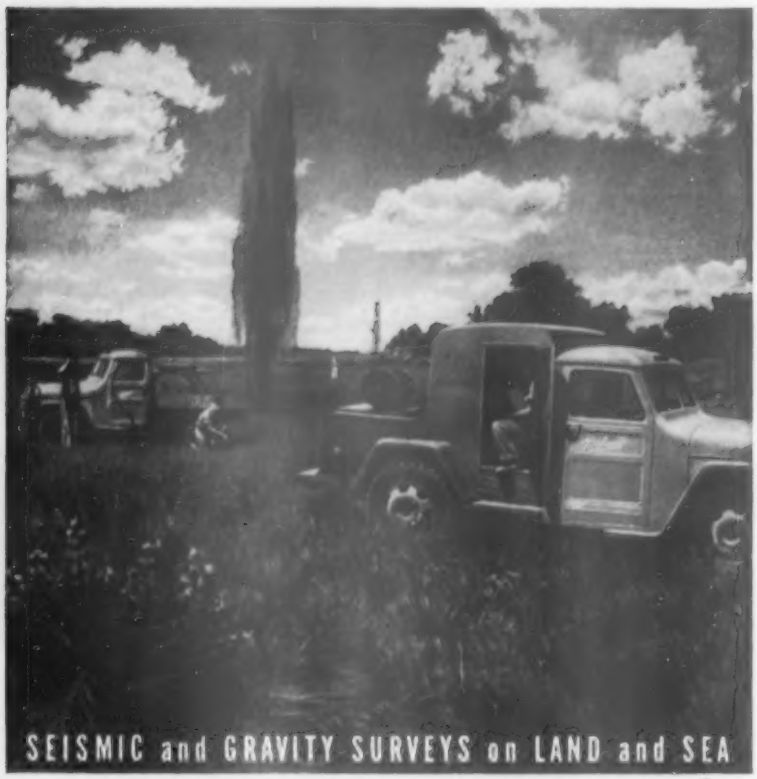
"Based on a solution-gas-drive calculation, the following values were found in the other three reservoirs:

	Primary	Pressure maintenance
First upper Rodessa, per cent	23.9	34.4
Upper Rodessa, per cent	11.9	21.6
Pettit, per cent	15.2	21.1

"The increase in oil production attributable to pressure maintenance is roughly a quarter million barrels for each zone. Although additional recoveries do not justify an independent pressure-maintenance effort in any of these zones, it is believed that pressure maintenance of these zones can be integrated with the lower Rodessa project. The committee therefore recommends that these zones be unitized. As is the case in the lower Rodessa zone, possibilities of additional recoveries to those stated above exist in these other three zones—the possibility of vaporization benefits is particularly attractive in the Pettit—and the committee recommends the investigation of these additional benefits.

"In conclusion, it was the committee's general belief that any of the recovery figures stated might vary in magnitude; yet the difference between pressure maintenance and primary recovery figures will be in the order of magnitude indicated and is minimum reasonable expected increase based on the type calculation used."

Statement accepted . . . The operators unanimously agreed to accept the engineering statement of feasibility and to unitize all zones at the earliest possible moment. A gas-plant committee was formed to request detailed bids for the erection of such a plant. At the suggestion of the royalty owners committee, all companies in the field except Cities Service Oil Co. accepted a participation factor based on 75 per cent



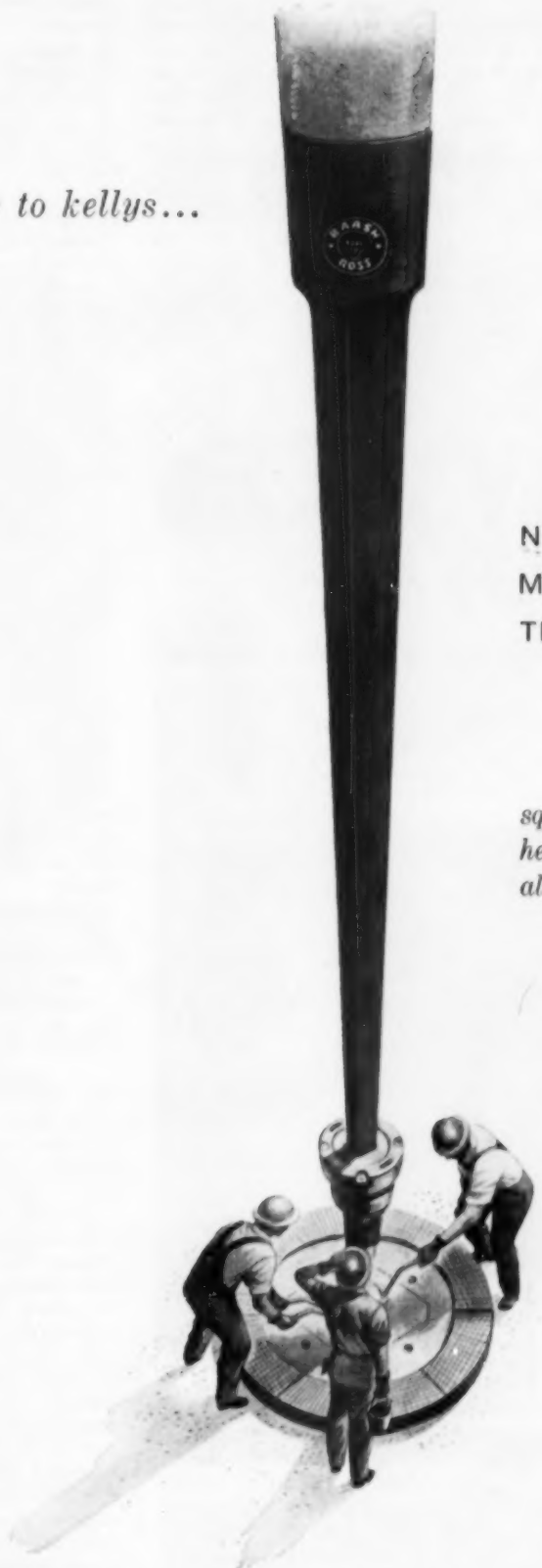
MAGNETIC SURVEYS • DENSITY LOGS
Seismic and Gravity Interpretations

A complete service within the organization with the most modern equipment and highly-trained personnel.

Tidelands
EXPLORATION CO. HOUSTON, TEXAS

2626 Westheimer LYnchburg 3781

when it comes to kellys...



NOBODY
MAKES A BETTER KELLY
THAN BAASH-ROSS

square kellys
hex kellys
all sizes

BAASH-ROSS TOOL COMPANY *Los Angeles, Houston, Oklahoma City, Odessa, Casper, Canton, New York*

acre-feet and 25 per cent well penetrations.

The Texas Co. agreed to prepare a unitization agreement. While this agreement was being prepared, a subcommittee of engineers rechecked the original calculations and found a probable net profit from pressure maintenance some 20 per cent higher than the original report. The unitization agreement was completed by April 1953, and at a meeting called to discuss it, Cities Service stated its inability to sign an agreement offering the participation factor that it had already dissented to.

The company offered as an alternative proposal the creation of two units in the lower Rodessa zone, with its wells in one unit and the remainder of the field in the other unit. This idea was studied in several conferences between the operators and Cities Service until June 1953, at which time it was decided by the engineering committee that recovery of oil would be decreased under a two-unit plan to 25 per cent. The engineering committee then considered it necessary to apply an interest factor to compensate for the deferment of gas sales under pressure maintenance. When this was done, and using the lower recovery factor, the committee decided that the pressure maintenance project was not feasible.

At this time the operators were confronted with a show-cause hearing called by the Railroad Commission in July 1953. It was agreed that The Texas Co. would present field data in this hearing, but that each operator would present his own opinion as to the feasibility of pressure maintenance.

At the hearing a majority of the operators expressed their dissatisfaction with the two-unit plan, and stated that they were only willing to join in a pressure-maintenance project under one unit operation. There was also considerable disagreement as to the use of an interest factor in the feasibility calculations.

Hearing Reset

The Railroad Commission was unable to come to a decision in the July hearing and consequently called for another hearing in October 1953. Following the second hearing the Railroad Commission entered an order on February 1, 1954, that no pressure maintenance would be required by the commission in this field.

The major indisputable fact of these studies and hearings is that pressure maintenance in Tennessee Colony field could result in a 70 per cent increase in oil production. The failure to undertake pressure maintenance must be attributed to the difficulty in bringing about a meeting of minds among the several operators as to a fair participation factor.

Since a great deal of the reservoir pressure loss had already occurred before any unitization effort was made, resulting in close to maximum retrograde condensation and oil shrinkage losses of the underground reserves, it would appear that an earlier unitization effort would have resulted in greater recovery; and would have, therefore, had a better chance to succeed.

I would believe that the Railroad Commission rules and regulations which governed this field during its development period were a major factor in the dissipation of reservoir energies prior to the unitization effort. A revision of these rules to prevent a similar failure in future Glenrose fields would be a valuable contribution to our conservation program.

Suggested changes . . . I would believe that four principal changes should be made to present Railroad Commission rules and regulations which would be aimed at first discovering the reserves under a field and then preserving natural energies until proper research can

WHEATLEY'S
OVER 1,000 NOW IN USE!
heap BIG little 3½"X5"
FOR: • OIL • MUD • ACID • SALT WATER • WATER FLOODING

Here's one you won't give back to the Indians! It's terrific for those specialized pumping jobs that have been worrying you. Why invest more money than is necessary for 20 H.P. down to 5 H.P.?

REPLACES 4" x 6" FOR MOST PURPOSES

Piston	Stroke	BPH	PSI	HP	Wt. Lbs.	Plunger Load
2"	5	35	900	15	700	2500#
2½"	5	56	520	15	700	
3"	5	83	350	15	700	
3½"	5	115	255	15	700	

- HERRINGBONE GEARS
- REDUCING LINERS
- POT TYPE FLUID END
- NO ROD OVERLAP
- ANTI-FRICTION BEARINGS
- CONTROLLED LUBRICATION

SAVE FLOOD BY USING 4.25 INSTEAD OF

WHEATLEY PUMPING UNITS AVAILABLE THROUGH:
• Charles Wheatley Cos. • Franklin Supply Co. • J & L Supply Co.
• United Supply Mfg. Co. • Walker-Neer Co. • D. T. O'Conner Co.
• Wheatley Equipment & Supply, Limited

OILFIELD WHEATLEY PUMPS & VALVES TULSA 1, OKLAHOMA

Effortless way to reduce Pumping Costs!

Specify DARCOVA valve cups, seating cups and rings

The Original composition valve cup ... still the best!

• Precise control of all materials and processes from lab to well means exceptional resistance to wear and deterioration . . . fewer pulling jobs! • Different textures, scientifically developed, fully proved, give peak efficiency and longer flex-life at *any* depth! • Accurately controlled sizes for any make or size pump . . . no misfit inefficiency! • Ask for *genuine* Darcovas at your supply store.

DARLING VALVE AND MANUFACTURING CO.

Williamsport 1, Pa.

Announcing...quick deliveries on

COMCO'S New

FLEETCOM 6/12 Volt 2-Way Radio

MODEL 400 - 6/12
MOBILE PACKAGE

$460

F.O.B. Coral Gables, plus State and Federal taxes. Price subject to change.

25- 50 MC - 25 WATTS OUTPUT } 8/4 Amps.
152-174 MC - 15 WATTS OUTPUT } Standby (6/12)

★ Change from 6 to 12 volts by merely reversing voltage selector plug.

★ Rugged construction with heavy duty power relay and fuse for engine compartment mounting.

★ Dual frequency provisions built in every unit.

★ Readily obtainable 6 volt tubes and vibrator used. 6146 Final amplifier.

★ Can be mounted under dash or almost anywhere. Case 11"x12½"x5½".

★ Low cost maintenance with COMCO color code tuning.

★ Standard manufacturers parts extensively used and identified for easy replacement at your local supplier.

★ Plus many other outstanding features described in bulletin 454 available upon request.

NOTE: Over 150 different COMCO VHF-FM models now certified with U.S. Federal Civil Defense Administration.

ATTENTION DEALERS! Liberal discounts. Write for available territories.

MANUFACTURERS OF RADIO & ELECTRONIC EQUIPMENT

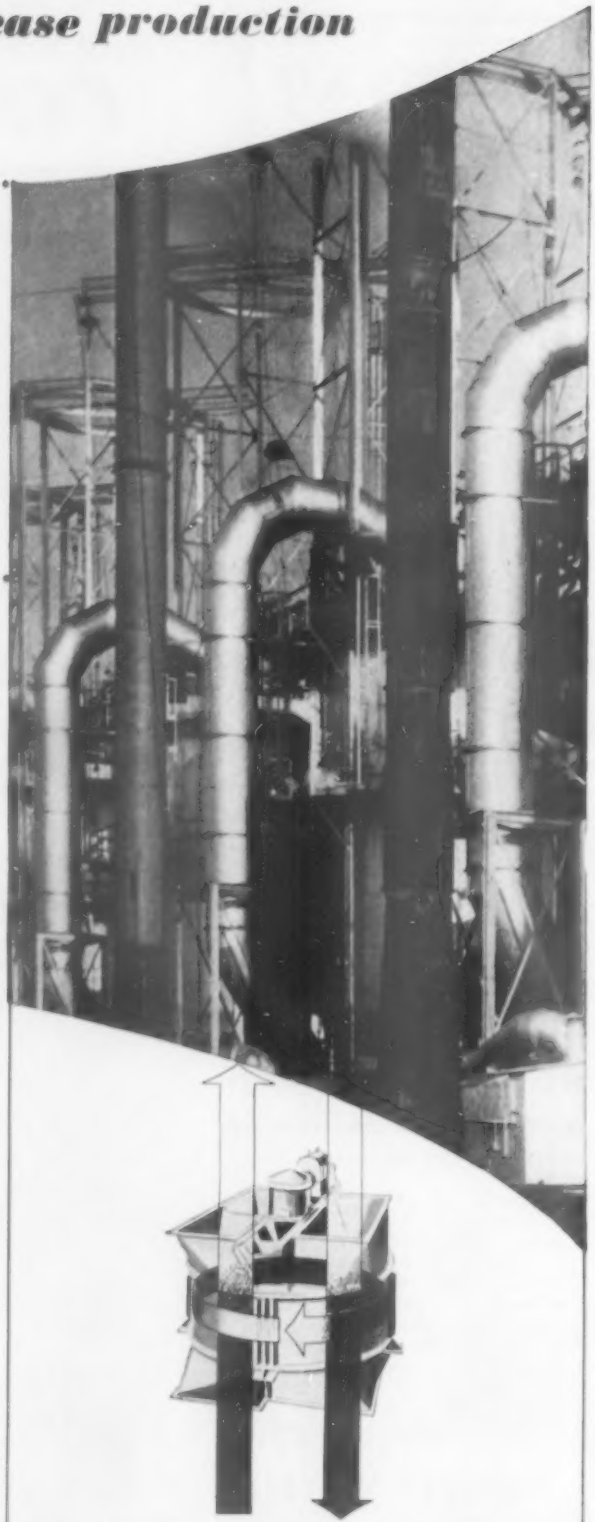
COMMUNICATIONS COMPANY, Inc.

CORAL GABLES, MIAMI 34, FLORIDA

Reduce slag...increase production

with the

Ljungstrom Air Preheater



Slag – primary cause of reduced capacity – can be practically eliminated by the use of a Ljungstrom Air Preheater.

That's because preheated air mixes more thoroughly with the fuel. Therefore, less excess air is required for complete combustion – and less combustible material is lost in the flue gases.

Thus, with a Ljungstrom Air Preheater, there is less material present in the furnace for slag production. Oil tubes stay cleaner . . . longer. Stills stay on stream *at top production* for months longer.

For example, a pipe still in an eastern refinery dropped from 16,000 barrels a day to 12,000 because of slag. Now, with a Ljungstrom Air Preheater and modern high-temperature burners, the still operates *continuously at 18,000/20,000 barrels.*

This saving alone can pay for a Ljungstrom installation in less than a year. Add it to more economical furnace design possible . . . up to 20% fuel savings . . . greater heat recovery even from low grade fuels . . . higher through-put – and you can see why the Ljungstrom Air Preheater is perhaps *the most significant guidepost to economy available today to refiners.*

For more complete details on what the Ljungstrom Air Preheater can do for you . . . for an analysis of the heat recovery benefits attainable in your fuel burning equipment – call or write The Air Preheater Corporation today.

The Ljungstrom operates on the continuous regenerative counter-flow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming cold air.

The Air Preheater Corporation

60 East 42nd Street, New York 17, N. Y.

WHEREVER YOU BURN FUEL, YOU NEED LJUNGSTROM

discover the method of producing the largest possible quantity of oil.

1. Discovery rules . . . Under present rules, a well is assigned a discovery allowable based upon its depth, but with no relation to thickness nor character of pay. The theory behind these discovery rules is to encourage wildcatting and result in the discovery of more oil. The effect is to quickly dissipate the energy in thin, deep zones and to set a precedent for high allowables which is difficult to overcome when the true weak character of the pay becomes apparent.

I would recommend a change in this discovery allowable to a more realistic and lower allowable based on some reasonable criterion such as withdrawal per acre-foot that is permitted in our present better sand fields during a limited period of time.

2. Well density . . . Forty acres is the maximum that the Railroad Commission currently permits in orders for oil fields in the East Texas area. Under primary recovery, this spacing is insufficient to permit a reasonable profit on the investment on average thickness lime wells. You also have insufficient economic enticement for an operator to maintain pressures since the economic returns are ordinarily marginal because of the small reserves under each well. I would recommend an increase to at least 80 acres for the dual purpose of more quickly probing the field limits and permitting at least a 2.5 to 1 return of the well investment based on primary production.

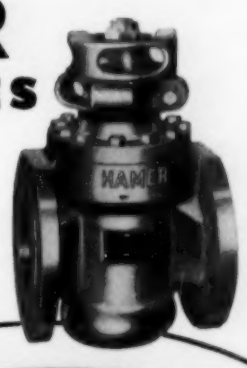
3. Well spacing . . . Under present Railroad Commission requirements, it is possible to "cluster" wells close to one another in adjoining 40-acre units. For example, in Tennessee Colony field, five wells close to the center of the field occupy less than 20 acres. Under no possible construction could they be said to adequately drain the 40-acre tracts upon which they are located. To all intents and purposes, one or two wells would have achieved the same drainage as do the present five. I would recommend a requirement by the commission that wells be located approximately in the center of their drilling units. In this manner only can more efficient drainage of the lime fields be achieved.

4. Proration formula . . . There can be no possible easy solution to the participation factor controversies such as existed in Tennessee Colony field when there is such a large difference between daily income to certain leases under unitization factors and under Railroad Commission allowables. A policy of regulating field allowables in such a manner that increases are possible under pressure maintenance will be very helpful in minimizing such reductions of daily income under unitization.

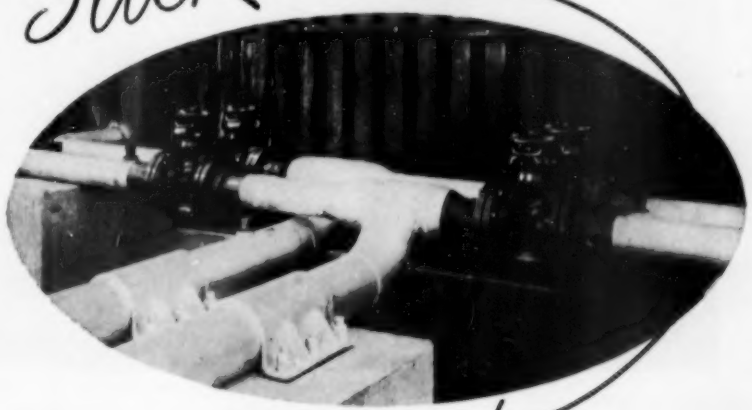
Even better would be proration formulas which are based upon equity rather than capture principals. There are any number of controversial problems involved in this particular subject which are beyond the scope of this paper. There is no question, however, of a need for greater similarity between proration formulas and participation factors under unitization.

It is not suggested that these changes to commission rules will have the effect of curing all problems in Glenrose lime oil fields discovered in the future. Cooperative action among operators is the only possible method of improving recoveries in these fields, and the changes suggested will only have the effect of permitting better results by such cooperative effort. It is my sincere hope that the experience of failing to improve recoveries in Tennessee Colony field will result in the changes needed in our conservation practices and operator attitudes to prevent such a failure in future Glenrose lime fields.

HAMER
PLUG VALVES
can't stick!



Model FS15P illustrated here has Pressure Seal packings which require neither tightening nor adjustment.



HERE'S WHY:

The plug adjusting nut, an exclusive feature on all HAMER PLUG VALVES permits the plug to be lifted slightly from its seat, making it easy to open or close the valve. A simple turn lowers the plug back into its seat and holds it there in perfect alignment. No matter what the service conditions, or lapse of time between operations, this outstanding HAMER feature assures POSITIVE E-Z turn control of the plug at all times.

HAMER *Line Blind Valves*

Built for strength and durability, HAMER LINE BLIND VALVES are the modern means of blinding pipe lines quickly and effectively. A one-man, one-minute operation. Cuts costs, and speeds up operations.

HAMER

Send for FREE Catalog

OIL TOOL COMPANY
2919 Gardenia Avenue
Long Beach 6, California
Representatives throughout the United States

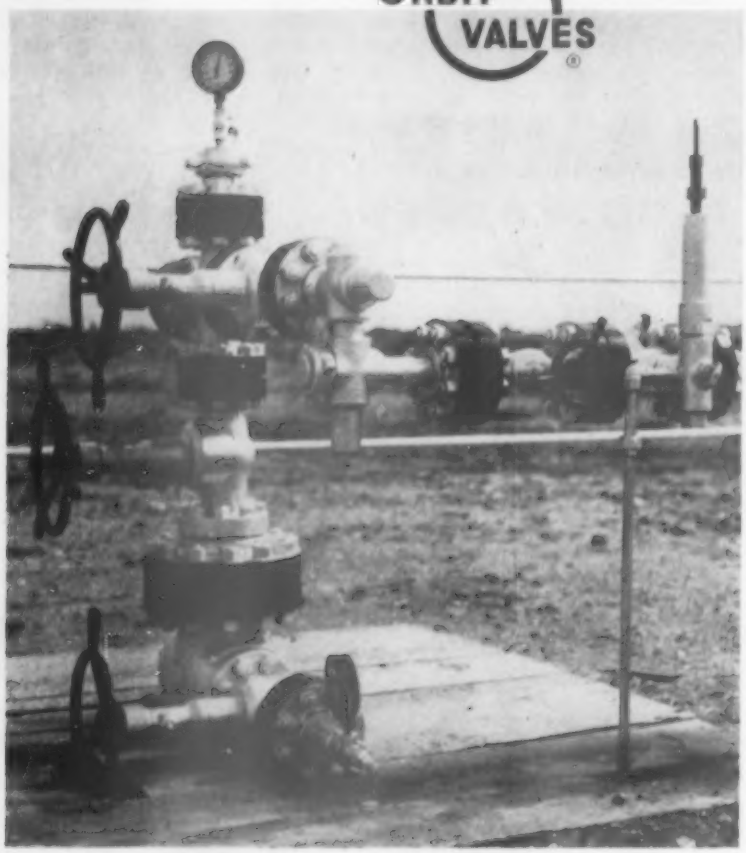
WHEN YOU BUY

CONTROL

YOUR FIRST CONCERN IS SAFETY

Your Best Insurance, therefore is Orbit Valves — Specify Them Always Whether You Buy Prefabricated Christmas Trees or Assemble Them.

ORBIT VALVES®



Bodies and Bonnets as well as most other component parts used in the construction of all Orbit Production Valves up to and including size 4" are made of Steel Drop Forgings. Steel Drop Forgings are of a known strength, therefore, chances for body or bonnet pressure leaks have been entirely eliminated. The bonnet is welded to the body to form an integral unit that is safe and compact in design. Available at your supply store and all well head manufacturers.

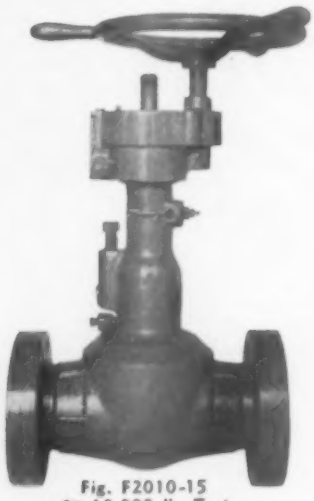


Fig. F2010-15
2" 10,000 lb. Test
A.P.I. Series 1500

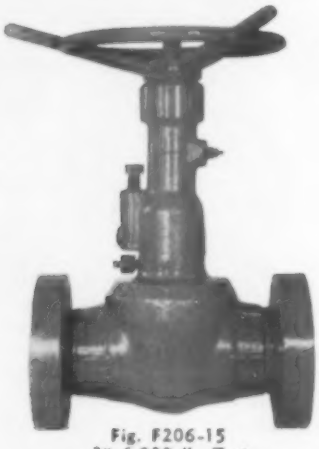


Fig. F206-15
2" 6,000 lb. Test
A.P.I. Series 1500

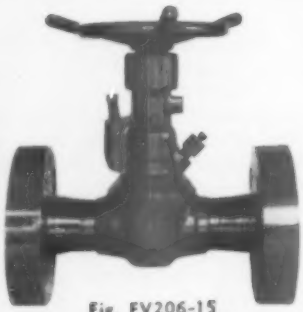


Fig. FV206-15
2" x 1" 6,000 lb. Test
A.P.I. Series 1500

ORBIT VALVE COMPANY

P. O. BOX 699 TULSA, OKLAHOMA

BRANCHES

HOUSTON, TEXAS
407 Velasco
(Serving the Gulf Coast)

CASPER, WYOMING
247 West First St.
(Serving the Rocky Mountain States and Canada)

ODESSA, TEXAS
402 West County Road
(Serving West Texas)

EQUIPMENT MEN . . . in the News

G-E Names Clark to Gas Turbine Sales

E. C. CLARK

Edward C. Clark has been placed in charge of General Electric's activity in the gas industry, it has been announced by T. F. Mackey, manager of heavy industries sales for the company's Apparatus Sales Division.

Clark will coordinate G-E's activities in use of gas turbines in various industries with particular emphasis on natural-gas pipeline pumping.

Clark joined G-E in 1941, serving as an a.c. motor and generator designer in the large motor and generator department. After graduating from the company's advanced engineering course, he became an application engineer in the chemical and petroleum engineering section, serving in Schenectady, N. Y., and Los Angeles.

Oakite Products Holds 28th Annual Meeting

Three hundred and fifty stockholders and employes of Oakite Products, Inc., gathered recently for the company's twenty-eighth annual meeting, John A. Carter, president, reports.

At the meeting, held in New York City, Carter outlined the advances made in 1953 by the company, manufacturers of industrial cleaning and related materials. Seventeen new technical service representatives were added to the company's nation-wide field staff, which now numbers 235 men, and new divisions were added in the Pittsburgh area. Ten new products for industrial production and maintenance cleaning were successfully introduced.

Four directors reelected to the board at the meeting, who will serve until 1957, were: J. J. Basch, manager of product research and development; David X. Clarin, New York and metropolitan division manager; Eustace Lingle, vice president; and Charles F. Radley, director of publicity.

Carbide & Carbon Forms New Sales Division

A new sales division of Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp., has been announced by W. F. Reich, Jr., vice president of the company. The southwestern division will include the states of Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Colorado, Wyoming, and Utah.

F. J. Rauscher, who was district sales manager of the St. Louis sales office, has been appointed division sales manager of the new division. His headquarters will be in St. Louis.

Reich also announced the following district sales manager appointments: H. L. Harwell, St. Louis district; J. W. Ross, Pittsburgh district; J. R. Hulten, Philadelphia district; and J. F. Luther, Albany district.

Sivalls Tanks Transfers Service Personnel

Transfer of sales and service representatives to Abilene and San Angelo has been announced by I. W. Lovelady, president of Sivalls Tanks, Inc., oil-field-equipment manufacturers.

JACK BRIGGS

BOB FRYMIRE

Jack Briggs has been named branch manager at Abilene where Sivalls maintains an office, warehouse, and tank storage yard. Bob Frymire has assumed the position of San Angelo representative. He and Briggs will cover the eastern and southeastern sections of the Permian basin.

Briggs joined Sivalls in 1950 and has represented the company in sales and service in both Odessa and Abilene. Frymire joined Sivalls in 1949 following graduation from University of Oklahoma.

Other Sivalls sales and service men work out of Odessa, Tex., and Hobbs, N. M.

Bovaird to Speak at Purchasing Agents Meet

D. D. BOVAIRD

Davis D. Bovaird, president of Bovaird Supply Co., will speak at the annual convention of Purchasing Agents Association, Chicago, May 24 through 26. Bovaird, who is president of Petroleum Equipment Suppliers Association, will speak on the subject "Your Partners in Petroleum Progress," relative to the relationship between the suppliers of oil-field equipment and the purchasing agents of the oil industry. He will address the oil buyers group at the convention.

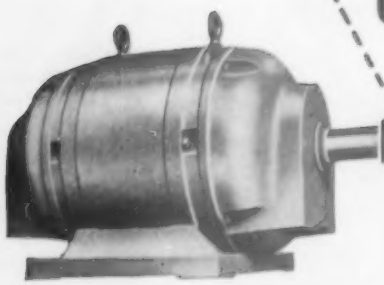
Bovaird is a director of the Oklahoma City branch of Kansas City Federal

Alten Foundry & Machine Works Holds Sales Meet

Sales representatives of the Petroleum Equipment Division, Alten Foundry & Machine Works, attended the company's sixty-fourth annual sales conference in Lancaster, Ohio, April 15 through 17. The 3-day program was planned by members of Alten's home office sales staff, and included merchandising and engineering discussions conducted by various department heads. Highlights of the meeting were a preview of Alten's new, completely redesigned pumping unit line and a tour of Alten's new pumping unit plant which was completed this past year.

built especially for

OIL COUNTRY REQUIREMENTS

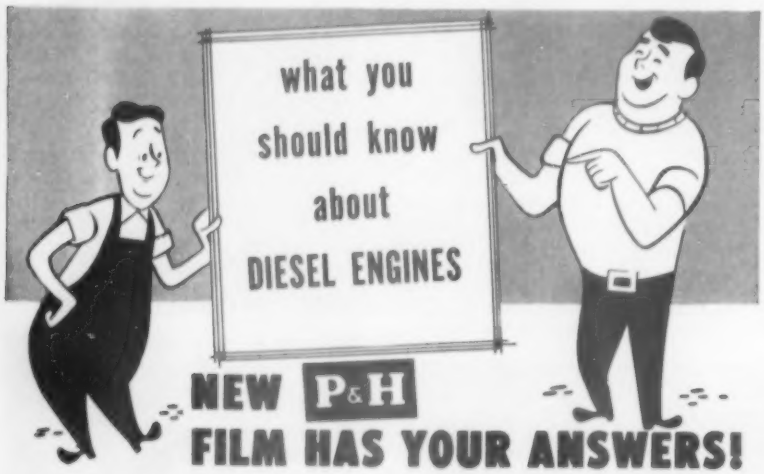


FIELDMASTER BALL BEARING MOTORS

- Vermin Proof
- Drip Proof
- Moisture Proof
- Corrosion Resistant
- Forced Air Cooled

The demand for an electric motor *especially* engineered to meet the exacting and varied demands of oil country operators is completely met with FIELDMASTER Ball Bearing Motors. Naturally, there's a type and h.p. specifically suited to fit your particular requirements. May we ask our distributor, BETHLEHEM SUPPLY COMPANY, to contact you?

VALLEY ELECTRIC CORP.
4221 FOREST PARK BLVD., ST. LOUIS, MO.



NEW P&H FILM HAS YOUR ANSWERS!

For a quick "Diesel education," you should see this new color slide film. You'll be wiser in the ways of modern diesel engines . . . how they operate . . . how they compare with gasoline engines . . . what they'll do . . . why they'll do it better . . . how diesels save you money.
For a personal showing of "What You Should Know About Diesel Engines," see your P&H Dealer. Or, write us for details.

P&H
DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H line

Reserve Bank. He is a director and member of the executive committee of International Petroleum Exposition and also a member of National Petroleum Council.

The oil buyers group meeting will be presided over by C. M. Taylor, purchasing agent of Cities Service Oil Co., Bartlesville, Okla.

B. S. & B. Announces Posts In Oil-Field Division

Lee Kelton has been appointed manager of oil-field sales, according to Floyd C. Myers, manager, oil-field

LEE KELTON

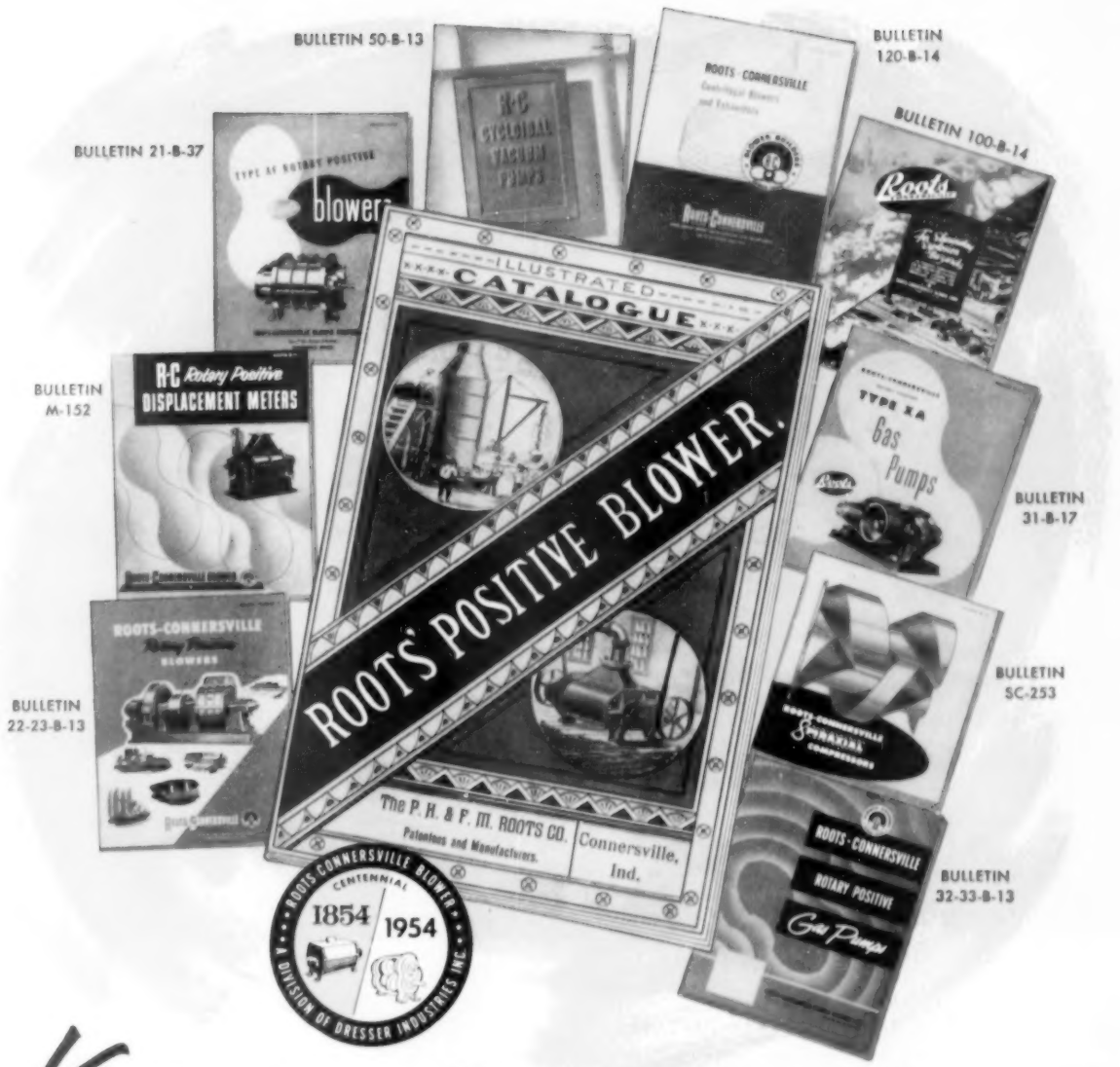
L. L. LAURENCE

sales and service division, at Black, Sivalls & Bryson, Inc., and Lawton L. Laurence has been promoted to manager of engineering, oil-field division, according to Chester A. Siver, vice president and general manager of engineering.

Kelton will be in charge of field and city sales activities in 12 B. S. & B. district sales territories covering the oil country. In the newly created engineering post, Laurence will head a broadened engineering program, including expanded engineering research and product development activities.

Kelton has served B. S. & B. in a wide range of capacities over the past 18 years, starting as branch clerk in Houston in 1935. He represented B. S. & B. in Odessa, Tex., and Hobbs, N. M., for several years, before becoming branch manager at Lafayette, La. In 1946 he was named branch manager at Casper, Wyo., and assistant district manager shortly thereafter. In 1947, Kelton became regional sales manager for the Rocky Mountain area, and when the new Casper sales district was formed in 1952, he became district sales manager.

Laurence began his career with B. S. & B. in 1941, but left for a short period of employment in the research department of Carter Oil Co. He returned to B. S. & B. as research and development engineer and worked on the development of dehydration and other gas processing equipment. In 1950, Laurence became chief engineer of the oil-field division, a post which



Keeping pace with industry for 100 years

This early "Roots" catalog, published in 1879, offered only Rotary Positive Blowers. That was our exclusive business at that time—25 years after the invention of the rotary positive principle by Francis M. Roots.

Today, because of the greatly increased use of gas and air for industrial purposes, it takes a great many bulletins and booklets to describe our expanded line of products. As new ideas, new developments are utilized in industrial processing, Roots-Connersville keeps pace with new equipment to handle gas and air most effectively and economically. And that is still our only business.

Into these bulletins, any of which are yours for the asking, are condensed our 100 years of experience in building such equipment, from the first Rotary Positive Blower in 1854 to our latest 1953 development, the Spiraxial Compressor. They describe R-C products which are up-to-date in design and construction, to match specific needs of industry.

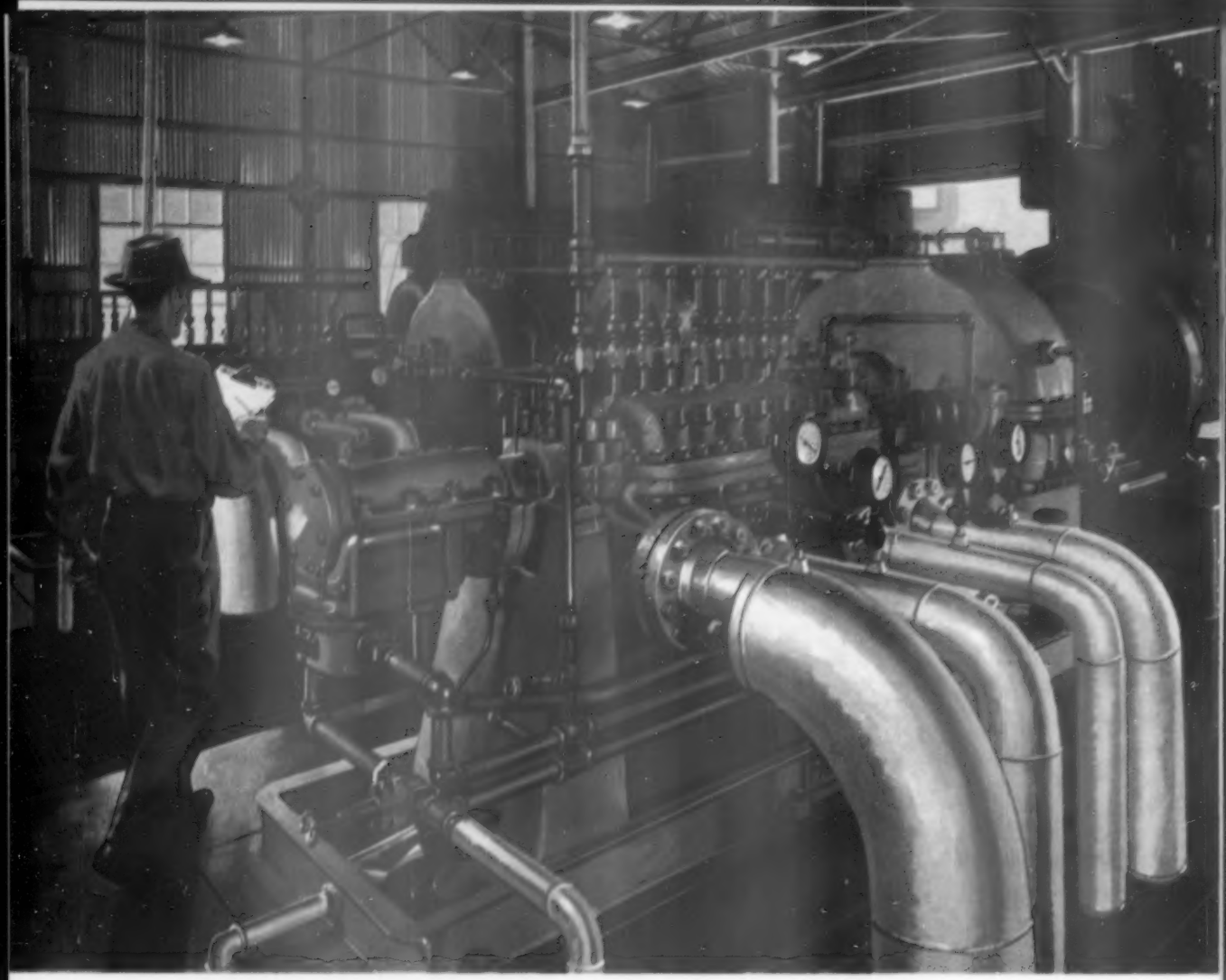
We suggest that when your business has a job of handling gas or air, you consult the exclusive specialists for 100 years.

Reg. U.S. Pat. Off.

BLOWER BUILDERS R-C SINCE 1854

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.
254 Jefferson Ave. · Connersville, Indiana



Pacific Pumps inc.

IS ONE OF THE DRESSER INDUSTRIES

Pacific Pumps Inc., of Huntington Park, California, has grown from a small group of six men in 1923 to one of the leading manufacturers of custom-built centrifugal and steam-turbo pumps in the United States. Pacific also licenses several manufacturers abroad. Superiority of design, engineering, quality and workmanship has elevated Pacific Pumps to a position of pre-eminence and leadership in the international petroleum and processing industries.

MAGNET COVE BARIUM CORP., Houston, Tex., Malvern, Ark. Magcobar drilling mud, Magcogel bentonite, Mylojel, Fiber Seal, Jel-Oil mud.

CLARK BROS. CO. DIVISION, Olean, New York. Engines and compressors—gas, steam and diesel driven.

DRESSER MANUFACTURING DIVISION, Bradford, Pa. Oil and gas pipe couplings, fittings and sleeves—rolled and welded rings—welded fittings and flanges.

KOBE, INC., DIVISION, Huntington Park, Calif. Complete hydraulic oil field pumping systems, including the Kobe Free Pump.

No. 7 in a series about Dresser Industries

What is the DRESSER plus+?

The Dresser Plus is the extra *service* you get when you deal with any Dresser company. It is an added advantage for you which stems from Dresser's unique overall organization. For Dresser is many companies with a single purpose—to provide the growing oil and gas industries with operating equipment that is *second to none.*

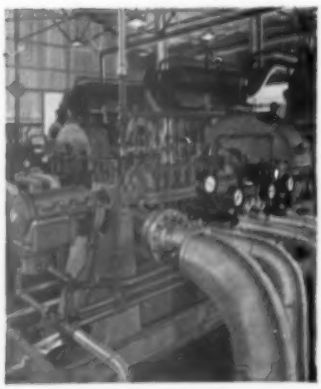
Each company in the Dresser group functions independently within its own specialized field—yet each can draw from the total resources, in manpower, research, and know-how, of the combined Dresser operations. When you work with any of the Dresser companies, all of the facilities of Dresser are *at your service.*

Planned, coordinated specialization—company by company—"one for all and all for one"—that is the DRESSER PLUS +

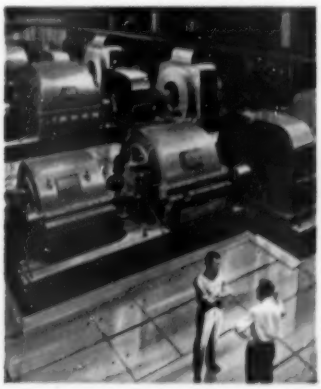
In the Utility, Industrial, Marine Service and other industries where steam generating is required, Pacific Custom-built Boiler Feed Centrifugal Pumps have long been accepted as the criterion. Pacific Pumps Inc. also operates an independent division (within the organization) exclusively devoted to the manufacture and sale of superior oil well plunger pumps.

DRESSER INDUSTRIES, INC.
OIL, GAS AND CHEMICAL EQUIPMENT

ATLANTIC BUILDING ★ DALLAS, TEXAS



PACIFIC PUMPS, INC., Huntington Park, Calif. Centrifugal pumps, deep oilwell plunger pumps, hot oil and boiler feed pumps.



ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind. Rotary positive blowers, gas pumps, centrifugal blowers, exhausters; positive displacement meters.

SECURITY ENGINEERING DIVISION, Whittier, Calif., Dallas, Tex. Rock bits, reamers, casing scrapers, reamer rock bits, coring bits, Securaloy.

IDECO DIVISION, Dallas, Beaumont, Tex. Derricks, drawworks, rambler drilling rigs, traveling blocks, rotary tables.

There is a good reason why more and more operators are standardizing on Security tools. They've done this because they know that in Security equipment they have a product manufactured in the world's most modern plants, that is unsurpassed for quality of design, quality of construction, and quality of performance.
And they know too, that there is a vast network of Security field representatives to service their needs wherever their rigs may be operating.
Why not get Security in your drilling today!
GET Security
IN your DRILLING
Branches in all major producing areas
GET Security IN DRILLING
ENGINEERING DIVISION
DRESSER OPERATIONS, INC.
ROCK BITS • REAMERS • HOLE OPENERS • CASING SCRAPERS • SECURALOY
Main Office: Whittier, Calif.—Export: Chanin Bldg., N.Y.C.
Plants: Whittier, Calif.—Dallas, Texas

he left in 1952 to become sales manager of the division.

Athey Products Announces Key Executive Changes

W. D. LEASE

Athey Products Corp. has announced several new executive positions. B. F. Lease, president of the Chicago manufacturing firm, announced the new officers following the company's annual meeting of the board of directors.

Administration of Athey's program of expansion will be in the hands of W. D. Lease, elected vice president, sales; R. W. Kling, vice president, engineering; C. E. Matthews, vice president, service and parts; and R. S. Hinds, treasurer and assistant secretary.

R. W. KLING

C. E. MATTHEWS

Lease has served Athey in recent months as manager of sales promotion. He joined the company in 1946, and has been district representative and manager of research and development.

Kling joined Athey Products in 1946. He became chief engineer in 1950, and was serving in that capacity when elected to his new post.

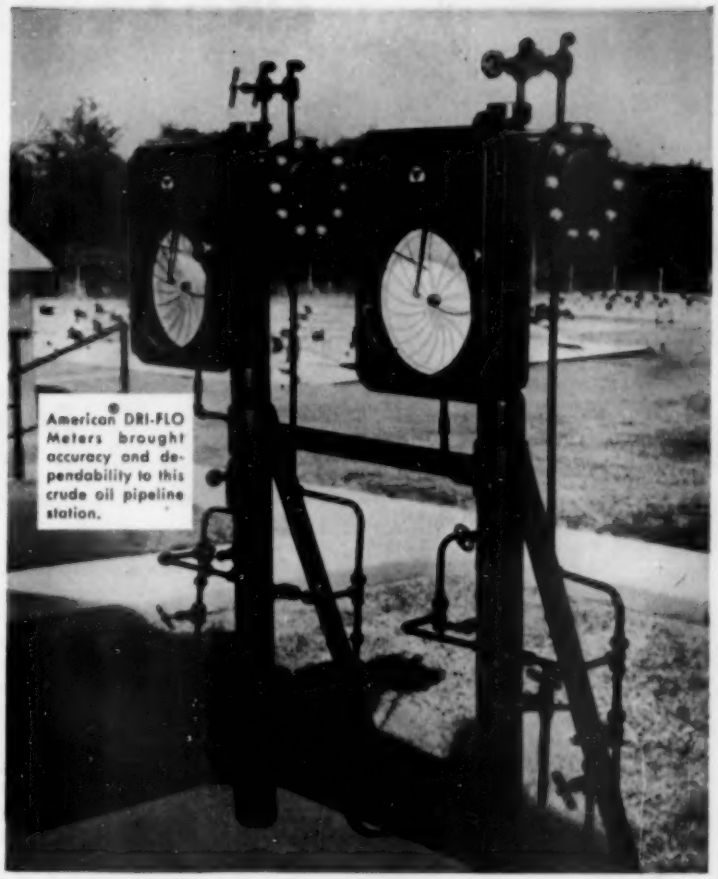
Matthews was manager of the service and parts department at Athey before his promotion. He joined the company in 1937 as a service engineer.

Hinds was elected treasurer succeeding George A. Anderson, who is retiring. Hinds was appointed controller in 1947 and assistant secretary in 1951.

Iverson Supply Promotes Schriber to Store Manager

R. N. (Dick) Schriber has been made store manager of Iverson Supply Co.'s new Odessa, Tex., store, according to S. J. Iverson, president.

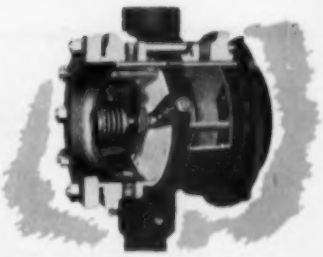
Schriber has served as field and storeman at Salem, Ill., later being transferred to the Iverson store at



Do you have a tough metering problem?

Installed at Mid-Continent Pipe Line Company's booster station at Seminole, Oklahoma, these two American DRI-FLO Meters measure high pressure (900 PSI) crude oil in the pipelines to the Company's Tulsa Refinery.

Meter accuracy and dependability are completely satisfactory despite constant vibration and the "tough" nature of the job. No seal pots are required, eliminating "blown" seals and emulsified mercury. Because of the close proximity (70 feet) to the discharge of the booster pumps, the meter pipestands are mounted in a concrete platform and are specially braced. Meter indications, read from the office window, help dispatchers quickly locate troubles such as line breaks, pump or valve failures—and eliminate running high pressure oil lines to the dispatchers office.



DRI-FLO Meters bring American-Westcott precision, simplicity of installation and maintenance, with maximum resistance to corrosive material, to applications where mercury manometers are not desired. Differential ranges: 20", 50", 100" and 200"; working pressures to 1000 PSI; Ambient temperatures of −25° to 175°F.

Write for full information

AMERICAN METER COMPANY

GENERAL SALES OFFICE: 1513 Race Street, Philadelphia
Albany • Alhambra • Atlanta • Baltimore • Birmingham
Boston • Chicago • Dallas • Denver • Erie • Houston
Kansas City • Los Angeles • Minneapolis • New York
Omaha • Pittsburgh • San Francisco • Seattle • Tulsa
IN CANADA: Canadian Meter Company, Limited, Hamilton
Edmonton • Calgary

Like Dollars in the Bank!

CSCO PUMPING ENGINES

1 Easy to Repair

Parts needing repair or attention can be removed from a CSCO with a minimum of disturbance of adjacent parts or assemblies. For CSCO design embodies *unit assemblies* . . . each quickly and easily accessible. For example, the piston and rod assembly is easily removed through the crankcase without draining the water or oil. *No other essential* parts are disturbed.

one of 4 outstanding features that make CSCO PUMPING ENGINES economical to operate:

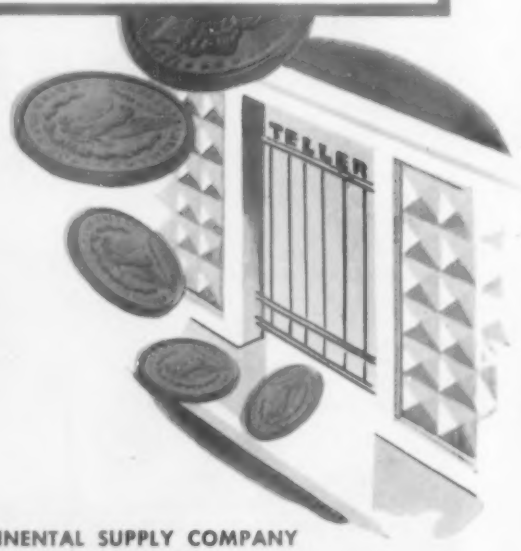
2 EASY AND SAFE TO START CSCO Engines were designed for oil well pumping and of top engineering importance was easy and safe starting. This is possible through exclusive CSCO features.

3 EASY TO SERVICE There's no need to stop a CSCO to check oil level . . . to add oil . . . to check water level . . . or to add water. Less shut-down for servicing.

4 SMOOTH, STEADY OPERATION The CSCO flywheel inertia provides peak power while the oil damped governor holds the throttle steady — permitting the engine to average the power up to its *full* capacity.

Not only is a CSCO Pumping Engine the easiest to repair when minor repairs are needed, but because of its unique and many exclusive features, a CSCO can be *completely renewed on the location* . . . with no machining operation necessary. As a result *you save* both hauling expense and the time required for dismounting.

CSCO Pumping Engines and accessories are available through Supply Stores other than Continental.



CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
Representatives in All Principal Oil Fields of the World

Farmington, N. M. Following this he was assigned to the district office at Midland, Tex., before moving to his present position.

Iverson Supply recently purchased property for the new Odessa store, where a large adjoining area is used for storage of a complete stock of tubular goods and heavy machinery.

Renfroe Rejoins Lane-Wells As District Sales Engineer

H. M. Renfroe has returned to Lane-Wells Co., and is now district sales engineer for the Southwest Texas district. He will make Alice, Tex., his headquarters. Before being called to service in 1952, Renfroe was for 2 years a Lane-Wells radioactivity well-logging operator in southern Louisiana, a position he took after receiving his degree in petroleum geology in 1950 from Mississippi State University.

Monroe Moved to New Post At Dresser Manufacturing

W. L. MONROE

William L. Monroe has been appointed assistant to the sales manager of Dresser Manufacturing Division, Bradford, Pa., according to H. Z. Hight, sales manager.

In his newly created position, Monroe will coordinate relations between Dresser's expanding customer service department and its customers in industrial markets.

Previously manager of the distributor section of customer service, Monroe joined Dresser in 1947.

Boyd Heads Oil Sales For Stewart & Stevenson

The appointment of King Boyd as manager of petroleum industry sales for Stewart & Stevenson Services has been announced by Joe Manning, vice president and general manager.

Boyd will be in charge of oil industry sales and promotion for all Stewart & Stevenson branches throughout Texas. He has had wide experience in engine sales for the oil industry. He went to work for General Motors in 1945,

What Do You Need of STEEL!

FLINT . . . your one-stop steel center will give you prompt delivery on most any kind of steel you need. Delivery can usually be made from stocks of:

GALVANIZED STEEL
for switch yards, substations, transmission towers, buildings, etc.

INDUSTRIAL STEEL
for buildings, plants, bridges and other heavy construction.

PLATE STEEL
for petroleum processing and chemical plant equipment, LP Gas and anhydrous ammonia tanks.

WAREHOUSE STEEL
for rolled bars, plates, structural shapes, and all other warehouse items.

PHONE WIRE WRITE

A Complete Service: STEEL • FABRICATION • ERECTION • DETAILING

Serving Southwest Industry Since 1915

FLINT STEEL

FLINT STEEL CORPORATION

TULSA • MEMPHIS

EXCEL-SO CALIBRATING TANKS

Send for Bulletin CT-102-53

For use in accurately calibrating positive displacement meters of refineries, terminals, pipe lines, loading racks, tank trucks and public sealers.

A calibrating tank, or meter prover, is essential in keeping your meters accurate. Small meter errors can be very costly. Here is a precision instrument which will quickly pay for itself. Designed to conform with the A.P.I. Code #1101 Excel-So Calibrating Tanks come in sizes from 50 gallons to 2000 gallons in both stationary and portable styles.

WARNER LEWIS COMPANY

BOX 1096 • TULSA, OKLAHOMA

Division of FRAM CORPORATION

Where Mission makes the difference

In the manufacture of Mission Super-Service Liners, there are scores of exacting operations that only Mission does which make the difference in performance you get in the field. For example, this huge induction hardening machine . . . the only one of its capacity and especially made for Mission . . . produces a deep, file-hard case which eliminates soft spots and prevents uneven liner wear. Finally, Mission applies the exclusive Satin Finish process . . . another "little thing" that no other liner manufacturer has ever done . . . as a further guarantee of longer service for your pistons and liners. Specify Mission Super-Service Liners to your supply store. Be assured that the difference Mission makes in its manufacturing, makes a difference in the performance and service you get in the field.

Nothing but the finest will ever bear the name of

MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York

"Don't Forget, the BIG difference is production"

There are many points of engineering that make Cabot Pumping Units different from other units. But the BIG difference, the truly important difference is PRODUCTION. Here are a few of the engineering reasons Cabot Units cut down time and maintenance costs and give more days and years of trouble-free operation.

The Cabot Adjustable-Crank is amazingly simple. The adjustments can be done by one man standing on the ground and with the cranks in one position. Single piece inner weights can be added by simply lifting them into place and securing with three bolts. All Cabot reducers have automatically flood lubricated, Sykes-cut herringbone gears. Oil seals on all reducer shafts have been eliminated. Heat treated high carbon steel slow speed shafts are extra large so that deflection is reduced to a minimum. Cabot's exclusive, shock-absorbing Equalastic® Bearing eliminates the conventional shaft, bearing, evener beam, and fittings. In their place four heavy rubber bushings are vulcanized to a single alloy steel shaft. The Equalastic® Bearing requires no lubrication and is resistant to salt water, sand, grease, grit and weather. It absorbs most vibrations, including high frequency vibrations from prime movers and well shocks.

On the drafting tables and in the field, Cabot unfailingly proves superior to any other pumping unit . and the big difference is PRODUCTION. Contact your nearby Jones and Laughlin Representative for complete information on Cabot Pumping Units.

CABOT

CABOT SHOPS, INC. PAMPA TEXAS

helping to introduce G.M. diesels in the Gulf Coast area.

Boyd has been with the oil-field engine division of Stewart & Stevenson for 4½ years. He will work out of the Houston office.

Cooper-Bessemer Opens Minneapolis Office

R. B. SCOTT

The opening of a branch office in Minneapolis has been announced by The Cooper-Bessemer Corp., Mount Vernon, Ohio, through Stanley E. Johnson, vice president and director of sales, and Charles L. White, district manager. In addition to the Minnesota area, the new office will cover the rapidly developing oil and gas field in North and South Dakota, as well as municipal and industrial power needs requiring diesel engines, engine-driven and motor-driven compressors.

R. B. Scott will be in charge of the newly established branch. Recently joining Cooper-Bessemer, Scott has wide experience in sales and application of similar equipment to that manufactured by Cooper-Bessemer.

Slaasted Made Young Advertising Manager

A. E. SLAASTED

A. E. Slaasted has been made advertising and sales promotion manager of Young Radiator Co., Racine, Wis., according to F. M. Young, president.

Before joining Young Radiator, Slaasted was advertising coordinator of power and electronic equipment, Allis-Chalmers Manufacturing Co. He also served Lindemann & Hoverson Co. as assistant advertising manager, and has had previous experience in retail promotion.

Dravo Corp. Opens Office For Southwest at Houston

Dravo Corp., Machinery Division, Pittsburgh, Pa., announces opening of a southwest office at Houston. The Houston office will handle the sale of prefabricated steel and alloy piping for power plants, oil and gas transmission

install
peak performance
into your
compressors (AIR · GAS · AMMONIA)

Peak performance, maximum efficiency, greater output, and lower power costs can be built into your oldest, and of course your newest, compressors by the installation of VOSS VALVES.

Check THESE VOSS VALVE ADVANTAGES:

- Quiet, vibration-free operation
- 20 to 60% more valve area
- less power consumption
- minimum pressure loss
- normal discharge temperature
- lower operating costs
- utmost safety

Our detailed proposal for increasing the efficiency of your compressor will be sent you without obligation. Send us the name, bore, stroke, and speed of your machine.

VOSS VALVES / J. H. H. VOSS Co., Inc. 786 East 144th Street, New York 54, N. Y.

OCECO
Emergency
pressure relief
Vents

prevent explosions

These units provide additional venting capacity beyond the breather vent, and give instant relief from excessive internal pressures resulting from exposure fires, etc., preventing tank blow-ups and explosions.

Required by many state fire codes. Recommended by both the N. F. P. A. and A. P. I.

The V-108 with cast aluminum cover, pictured at the top, furnished in 6", 8" and 10" sizes; V-108-A with fabricated aluminum cover, pictured below, furnished in 15¼" and 20½" sizes. *Write for full details today.*

OCECO TANK FITTINGS
THE JOHNSTON & JENNINGS CO.
division of PETTIBONE MULLIKEN CORP.
4751 West Division St. • Chicago 51, Illinois

Underground pipe corrosion

robs $600,000,000 a year!*

But KRALASTIC pipe can't corrode!

It can't rust or rot—is free from electrolytic action—impervious to water and the usual soil elements—highly resistant to most chemicals. Pipe made of Kralastic® rubber-resin never needs coating, lining, or anode protection.

What's more, amazingly tough Kralastic pipe gives a host of *other* advantages over conventional pipe materials.

- Kralastic pipe is extremely lightweight—needs no heavy handling equipment or costly bedding.
- It can be snaked through many existing lines—eliminates much time and money-wasting ditching.
- It offers extremely low internal friction—will not accumulate scale.
- It can be quickly and easily solvent welded—by relatively unskilled workers. Or it may be threaded and used with threaded fittings.
- Kralastic has outstanding impact strength—even at Arctic temperatures.

In short, Kralastic is a *non-corroding* pipe material with a combination of properties *no other pipe material can match.*

The first rubber-resin to produce successful plastic pipe, Kralastic is available in a wide variety of pipes and fittings in IPS and SWP sizes—proved in oil lines, salt water disposal, natural gas, and pipe applications by the hundreds.

Better look into Kralastic today. Simply write on your letterhead to the address below.

*Estimate of the U. S. Government National Bureau of Standards.

50th ANNIVERSARY 1904 1954 NAUGATUCK CHEMICAL

Naugatuck Chemical

Division of United States Rubber Company

515 ELM STREET, NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario

systems, refineries, petrochemical and chemical plants, and other manufacturing processes.

Additional items handled by this office will be Dravo's complete line of oil and gas fired industrial space heaters and process drying equipment, and the division's construction services.

George R. Beidler, formerly of Dravo's New York office, has been named as district manager.

Three Officers Promoted By J. B. Beaird Co.

C. T. BEAIRD

Three officers of The J. B. Beaird Co., Inc., Shreveport, La., have been promoted, according to an announcement by J. Pat Beaird, president.

Charles T. Beaird was elevated to vice president, John L. Tullis to vice president and general manager of sales, and Melvin F. Johnson to secretary.

Other officers reelected were: J. G. O'Brien, vice president and treasurer;

J. L. TULLIS

M. F. JOHNSON

C. N. Wibker and L. J. Sarosdy, vice presidents; and J. R. Querbes, Jr., assistant secretary.

Charles T. Beaird, in addition to his new position as vice president, is president and general manager of The J. B. Beaird Co., Inc., of California, wholly owned subsidiary located in Stockton.

Tullis was, for a number of years, engineer with Texas Power & Light Co., Dallas. He joined Beaird sales organization in March 1947, and for the past several years has been general manager of sales. He also serves as vice president in charge of sales for The J. B. Beaird Co., Inc., of California.

Melvin F. Johnson, Shreveport attorney, has served as the company's general counsel for many years and succeeds Charles T. Beaird as secretary.

Reelected to the board of directors were: J. Pat Beaird, Charles T. Beaird, J. G. O'Brien, C. N. Wibker, J. R. Querbes, Jr., and Edward F. Nield, Jr.

Kaiser Names Cornforth to Manage Refinery Sales

Robert M. Cornforth has been appointed manager of refinery sales for Kaiser Engineers Division of Henry J. Kaiser Co., George Havas, vice president and general manager, has announced.

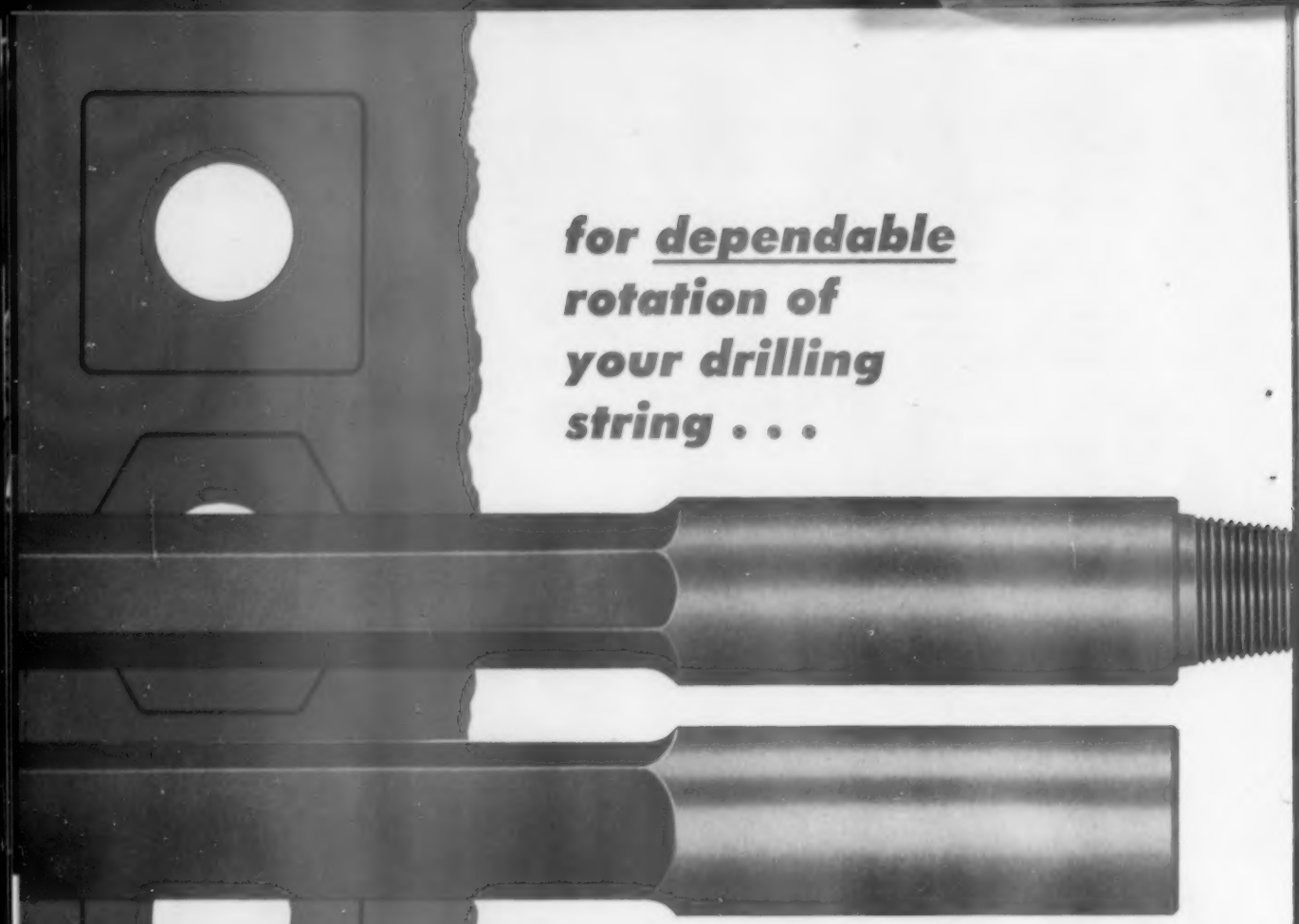
Cornforth, who will specialize in matters pertaining to the petroleum industry, was formerly vice president in charge of sales for W. M. Barnes Co., petroleum and petrochemical plant engineers and constructors.

Cornforth was with Standard Oil Co. of Indiana as a chemical engineer for 5 years, and later became associated with Houdry Process Corp., Philadelphia, where he was manager of sales.

National Supply Opens Lake Charles Store

The National Supply Co. has opened an oil-field supply store at Lake Charles, La., to serve drillers and producers in the area. The company has six other stores in Louisiana.

P. D. Waters, formerly sales representative at New Orleans, has been appointed manager of the store. It is



for dependable rotation of your drilling string . . .

AMERICAN IRON KELLYS

HEX OR SQUARE

Yes, from rough forgings to finished boring and threading operations, dependability is built into American Iron Kellys every step of the way!

Correct forging processes plus straightness, joint alignment, concentricity of bore, hardness and precision threaded connections make American Iron Kellys better balanced for smooth running at all drilling speeds.

For dependability . . . and ability to do the job right . . . choose American Iron Hex or Square Kellys!

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
OKLAHOMA CITY U.S.A.

PESA

MANUFACTURERS OF DRILLING AND PRODUCTION EQUIPMENT · FISHING TOOLS · PUMP SPECIALTIES

under the supervision of L. A. J. Monroe, district manager of the New Orleans district.

The new store is completely stocked with machinery and equipment items. It will serve Vernon, Beauregard, Calcasieu, and Cameron parishes, and parts of Allen and Jefferson Davis parishes.

Johnston Testers Names Assistant Sales Manager

Phil Griffin has been elevated to assistant sales manager of Johnston Testers, Inc., and will be located in the general office in Houston.

He has been with Johnston in an engineering and sales capacity since October 1951. His assignment prior to the present one was sales representative in the Dallas-Fort Worth area. From 1945 until joining Johnston Testers, Griffin was employed in drilling and production.

Briggs Filtration Changes Key Sales Personnel

WOODWARD

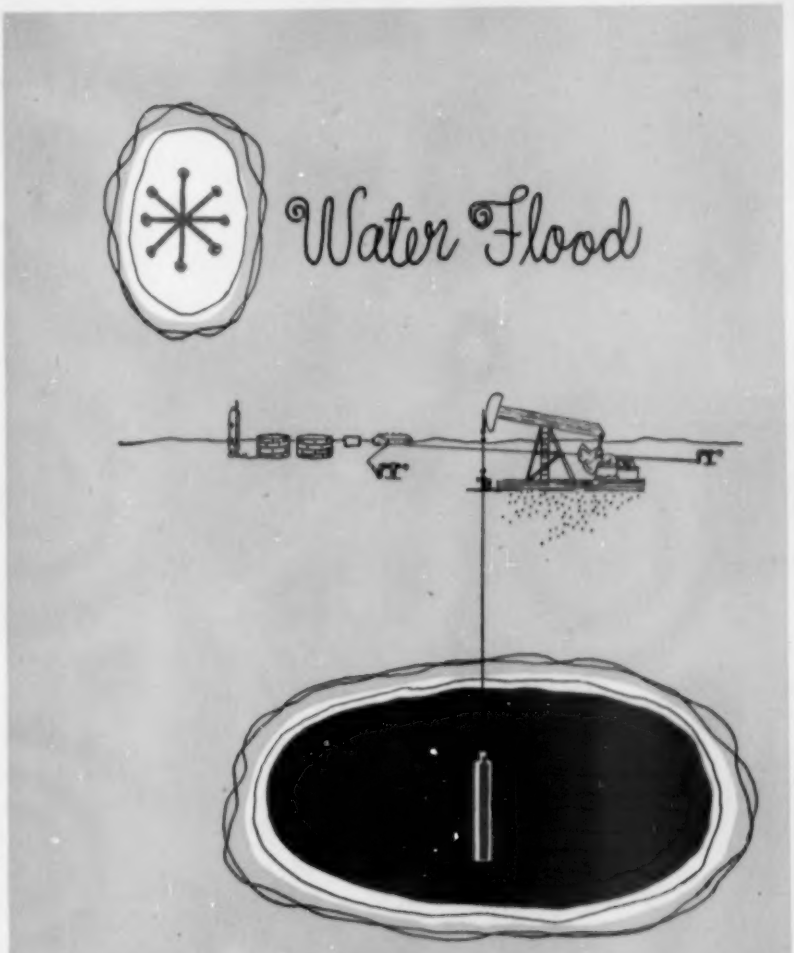
The Briggs Filtration Co. has announced the following changes in its industrial sales organization.

H. K. Woodward, formerly regional manager of the Northeastern and North Central regions, has been promoted to the position of general industrial sales manager. Woodward, regional manager for the past 6 years, has been a member of Briggs organization since 1945 in various sales, sales development, and research capacities. His new duties include directing all functions of the company's industrial sales program.

John D. MacGuffin has been named regional manager of the North Central region with headquarters in Chicago, and C. J. DeVries, regional manager of the Southeastern region. R. A. Howland will continue to be regional manager of the South Central region.

Thorntons Acquire Fox Diamond Derrick Stock

Announcement of the acquisition of controlling stock interest in Fox Diamond Derrick Co., manufacturers of portable masts, has been made by C.



One good reason for the widespread use of a Harbison-Fischer Double-Displacement Rod Pump in water flood production wells is the operating flexibility of a sucker rod actuated insert pump as compared to centrifugal or reciprocating pumps. Double-Displacement rod pumps also will handle more volume than a tubing pump.

The Double-Displacement Pump is a full insert type assembly with two plungers and barrel tubes in tandem operating with a single set of valves. It seats in a standard cup type seating nipple or the old working barrel in the tubing, and operates like any other conventional insert pump. Double-Displacement Pumps are available in bottom hold-down types in 2" x 1½", 2½" x 2", 3" x 2½" and 4" x 3¼" sizes with these bore constants: 1½"=.408; 2"=.762; 2½"=1.194; 3¼"=1.892. (To calculate production for 24 hrs., multiply S/Min. x length of stroke x constant.)

Double-Displacement Pumps with H-F Flexite Ring Plungers are recommended for wells making water, but Tuff-Temper, Precision, and H-F Composition Ring Plunger assemblies are also available for various well conditions.

Double-Displacement Pumps are in successful operation in various fields throughout the mid-continent area, including many water flood projects. Leading stores will be glad to give you additional information, or write to us for an illustrated bulletin and comparative field test data. Harbison-Fischer Mfg. Co., P. O. Box 127, Fort Worth, Texas. Factory representatives throughout the oil country.

HARBISON-FISCHER

Double-Displacement WILSON PAT PEND

ROD PUMP

600-barrel UOP Platforming unit installed at R. J. refinery near Princeton, Ind.

PLATFORMING CHANGES MARKETING METHODS OF R. J. OIL & REFINING CO.

By Henry P. Smith, President
R. J. Oil & Refining Company, Inc.

HIGH quality products being produced in our new UOP Platforming unit have given R. J. new stature in its marketing area and have brought about sweeping changes in marketing techniques.

Henry P. Smith

Before the Platforming unit went on stream at our refinery near Princeton, Ind., R. J. sold premium and regular gasolines at prices lower than those posted at the wholesale outlets of other oil companies.

Now, because R. J.'s gasolines have the highest octane ratings of any in our marketing area, we are commanding prices on a par with those of other companies. And a new theme song—"Fill 'er up and feel the difference"—is being chanted by motorists patronizing our stations.

Motorists are enthusiastic in their praise of the new "Platolene" premium gasoline and "500" regular—both products of the UOP Platformer.

Gasoline sales have nearly trebled since September 5, 1953, when the Platforming unit went on stream. A credit card system was established recently, and already 200 motorists in the 100-mile area R. J. serves have availed themselves of this service.

First Standard "A" Unit

The process design for the Platforming unit was handled by Universal Oil Products Company engineers. All of the mechanical design and drafting, purchasing, and construction were handled by Procon Incorporated. The unit is the first "package" installation of a Standard "A" UOP Platforming process unit.

The decision to install the Platforming unit was made after careful investigation convinced R. J.'s management that it was the ideal catalytic reforming process which would enable the company to become a leader in a marketing area where the race for higher octanes was constantly increasing.

Other factors which motivated our decision were:

—We felt that Platforming would give R.J. a more marketable product.

—We were convinced R. J. could abandon its below-market price policy because of high quality products without suffering a loss in sales.

—We believed that a Platforming unit would give the refinery sufficient flexibility so that the company could always stay on top in the octane race.

—UOP's long record of giving service to licensees.

R. J.'s Platforming unit is equipped with a desulphurizer. Raw charge consists of 400° F. straight run gasoline which goes from storage to a heater, the desulphurizer and then to a prefractionating column.

A cut of approximately 270° F. end point is removed overhead from the prefractionator. The reactor charge, taken as a sidecut from the prefractionating column, is of 400° F. end point material. The sidecut goes from the reactor charge pump through three heaters and reactors.

Recycle Gas Through Reactor

After passing through the No. 3 reactor, the material is sent to a products separator. The compressor takes suction from the top of the separator and recycles the gas through the reactor section.

The liquid bottoms product from the separator is charged to the stabilizer together with overhead material from the prefractionator. Stabilizer effluent is pumped to storage as marketable products.

Sulphur content of the charge stock is converted in the desulphurizer into H_2S, which in turn is removed from the prefractionator in a net overhead cut. The H_2S is removed overhead when this cut is charged to the stabilizer. Gas from the stabilizer is sent to a gas balance drum before being injected into the refinery fuel gas system.

R. J. has spent nearly $1,000,000 to bring to its motoring public the finest gasoline that can be produced. Because of the increasing demand for our gasoline and other products, we are contemplating an extensive expansion program. Present plans call for doubling the size of the Platforming unit from its present 600 B/SD capacity. It is hoped that this expansion program will be completed by late 1954 or early 1955.

It is our firm belief that Platforming has made R. J. an increasingly important factor in the economic life of southwestern Indiana, and that the company will continue to grow and prosper because of the superior quality of its products made possible by Platforming.

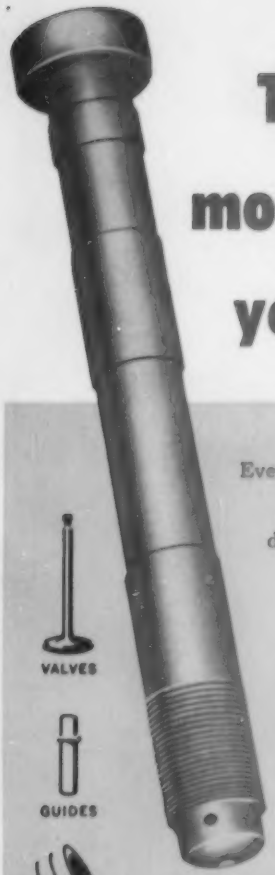
(Advertisement)

first
600 barrel
UOP Platformer
on stream

designed, engineered and licensed by

UNIVERSAL OIL PRODUCTS COMPANY
30 ALGONQUIN ROAD,
DES PLAINES, ILL., U. S. A.
Laboratories: RIVERSIDE, ILLINOIS

Universal Service
Protects Your Investment



This can be the most important bolt you ever owned!

VALVES

GUIDES

SEATS

VALVE SEAT GRINDERS

PISTON RINGS

Every operator of big industrial gas and diesel engines knows that failure of a single connecting rod bolt can cost thousands in downtime and repairs. **That's why Thompson forged steel Connecting Rod Bolts can be the most important bolts you can own!**

Thompson manufactures Connecting Rod Bolts for a complete range of heavy duty industrial engine sizes and makes. They are electrically upset and hot-forged from a single bar of tough alloy steel. The control of the grain flow in the bolt head through this special method enables this bolt to have far higher strength and fatigue resistance than those machined from bar stock or forged by ordinary methods.

Rough machining of the bolt is followed by grinding and polishing on all fit diameters, stress relieving grooves and radii to a precision finish. Threads are ground or rolled—not cut—so that the finished bolt is entirely free of damaging tool marks.

This is just one more example of how Thompson manufacturing methods and products can help you. Like Valves, Seats, Guides and Piston Rings, Thompson Connecting Rod Bolts are making important strides in reducing engine operating and maintenance costs wherever big engines operate. Detailed information is yours for the asking—mail the coupon today!

You can count on Thompson Products, Inc.

WEST COAST DIVISION

Thompson Products, Inc., 8354 Wilcox Ave., Bell, California

Please send me complete information on Connecting Rod Bolts for _____ (MAKE & MODEL)

Engines with _____ (BORE) **and** _____ (STROKE)

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ **STATE** _____

Victor Thornton and W. Lloyd Thornton, of Fort Worth. The Thorntons also operate Thornton Steel Co., Fort Worth.

Newly elected officers of Fox Diamond Derrick Co. are: C. Victor Thornton, president; W. Lloyd Thornton, vice president and secretary; and Walter Z. Leatherwood, treasurer.

Baash-Ross Appoints Carne To Long Beach Area

E. W. CARNE

E. W. Carne has been transferred from the Ventura, Calif., to the Long Beach, Calif., area where he will act as sales representative for Baash-Ross Tool Co., according to Hal Messinger, California sales manager.

Carne has had extensive experience in rental-service and sales operations for Baash-Ross. Starting in 1946 as a shop man in the rental-service department of Baash-Ross Ventura branch, he was promoted in 1951 to sales representative for the company, covering the Ventura-Castaic and Santa Maria fields, from which position he was moved to his new Long Beach location.

Prior to joining Baash-Ross, Carne was employed by Chanslor - Canfield Midway Oil Co., working in drilling and production operations in the Rincon and Fellows area.

Cook Visits U.S., Canada

Stanley C. Cook, export sales manager, Le Grand, Sutcliff & Gell, Ltd., left England recently on a visit to the United States, where he expects to call at New York, Dallas, Tulsa, Los Angeles, and San Francisco before visiting the oil fields of Canada.

Clark Joins Western Co. Staff as Coordinator

ROSCOE CLARK

Roscoe Clark, of Ponca City, Okla., has joined the staff of The Western Co., technical oil and gas servicing concern with general offices at Midland, Tex. John F. Younger, research and development vice president, announced that Clark will assume duties of coordinating all Western research in acidizing, fracturing, perforating, and radioactivity well logging.

Beginning in 1946, Clark spent 18

This simple idea saves money in V-Belt Costs

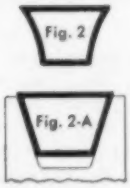
You can prove it in two minutes!

To prove how the CONCAVE SIDES of GATES VULCO ROPES *save money*, just make this simple test—

Bend *any* V-Belt that has *straight sides* (Fig. 1) and—as the belt bends—*feel* the sides *bulge out* (Fig. 1-A). This out-bulge concentrates the wear at the points shown by arrows—and this naturally shortens the life of a *straight-sided* belt!

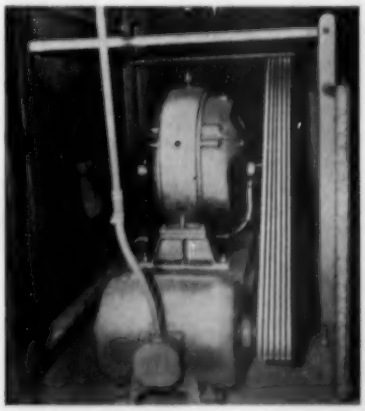
Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U. S. PAT. 1813698)



You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt *life* and *lower* belt *cost* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

VULCO ROPE DRIVES

THE GATES RUBBER COMPANY
DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

GS-548

Broad petroleum-industry painting requirements demand broad paint-industry technical research and experience.

That's why Sherwin-Williams, with the most extensive technical facilities in the paint industry, can offer competent help on any and all of the varied painting requirements of petroleum operations. You'll find helpful petroleum industry experience available from your Sherwin-Williams Petroleum Sales Representative . . . useful painting recommendations in the new Sherwin-Williams Petroleum Finish Selection Guide B-770. Write for your copy. The Sherwin-Williams Co., Petroleum Division, Cleveland 1, Ohio.

months in the oil-well servicing industry dealing with well stimulating methods. For the following 5 years Clark was with Stanolind Oil & Gas Co. where he gained extensive experience in production, reservoir engineering, and completion practices. His field engineering work was largely in the Permian basin, Oklahoma and Kansas.

Brill Equipment Opens Office in Houston

Brill Equipment Co., New York, has opened an office in Houston, and is engaged in the liquidation of a substantial portion of a large petrochemical plant in the Beaumont, Tex. area. For over 25 years Brill has been in the business of selling new and used chemical and petrochemical processing equipment. The firm also specializes in the liquidation of complete plants.

Lucey Makes Sterling Rocky Mountain Manager

Norman Sterling, Jr., has been made district manager of Rocky Mountain operations for Lucey Products Corp. Offices have been established in the Kittredge Building, Denver.

Sterling has served in the sales organizations of Broderick & Bascom Rope Co. and Waukesha Engine & Equipment Co.

Reilly is Chief Appraisal Engineer for Ebasco

John J. Reilly has been appointed chief appraisal engineer of Ebasco Services, Inc., the company has announced. Reilly succeeds W. M. Black who has been appointed consulting appraisal engineer. Reilly will be responsible for the supervision and preparation of engineering valuations and depreciation studies.

Following his graduation from Ohio University in 1932 with a degree in civil engineering, Reilly worked for the city of New York as a structural engineer before joining Phoenix Engineering Corp. a predecessor of Ebasco, in 1937. Starting with Ebasco as a design engineer he worked successively as administrative assistant, general office engineer, and appraisal engineer.

He was later assigned to the tax department as tax engineer in charge of valuation, depreciation, and economic studies in connection with federal income and excess profits tax work.

Sunset AT 3-BAR RANCH

Day after day through the years gas produced from oil wells on the 3-Bar Ranch in Andrews County, West Texas, will be gathered, compressed, processed, and reinjected into the producing formation — resulting in the production of many hundreds of thousands of barrels of otherwise unrecoverable crude oil, the extraction of millions of barrels of liquid hydrocarbons from the gas, and the availability for markets in future years of a large dry gas supply.

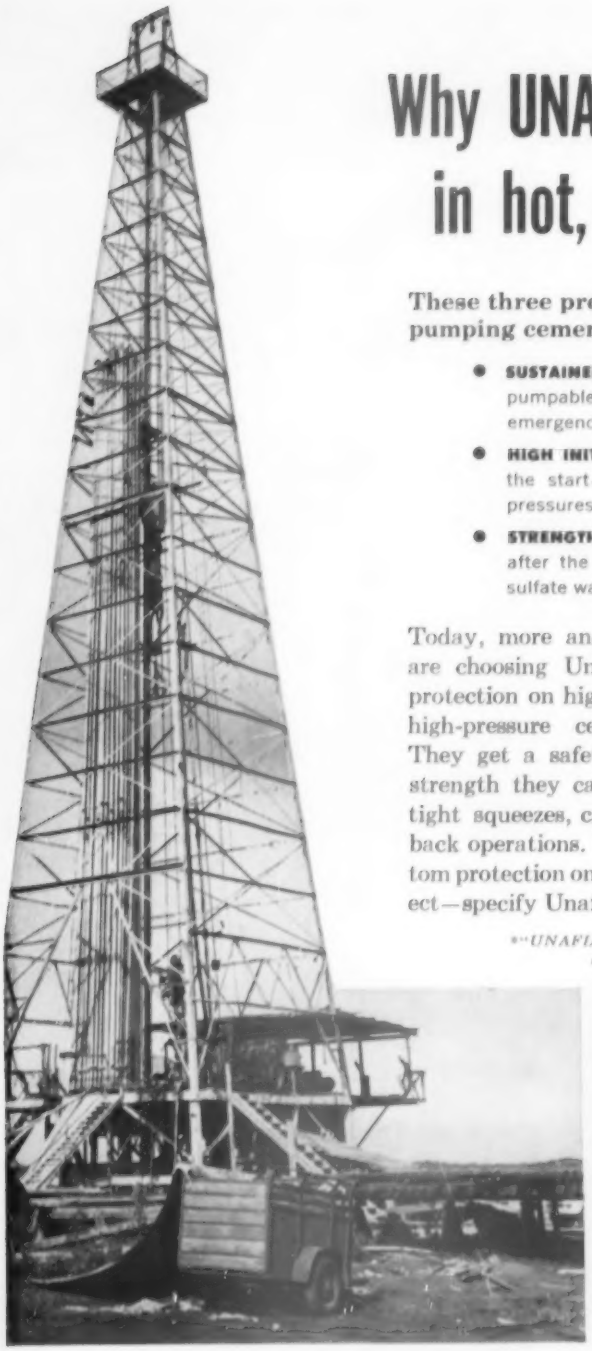
Hudson designed and constructed the plant in collaboration with Stanolind Oil and Gas Company. Stanolind operates the plant and shares in its ownership with Humble Oil and Refining Company, Champlin Refining Company, and the Superior Oil Company.

The facilities are designed to compress casinghead gas to a reinjection pressure of 2,700 pounds per square inch, and to recover from the gas heavier hydrocarbons which are fractionated into liquid products.

Designers and Constructors of Oil and Gas Processing Plants

HUDSON
ENGINEERING CORPORATION

FAIRVIEW STATION • HOUSTON, TEXAS



Why UNAFLO* gives extra safety in hot, deep cementing jobs

These three properties of Unaflo add up to a longer, easier-pumping cement in deep, hot wells:

- **SUSTAINED FLUIDITY** — Unaflo has a retarded set . . . stays pumpable and gives vital extra time to finish the job if any emergency arises.
- **HIGH INITIAL FLUIDITY** — Unaflo is easy-pumping right from the start—maintains fluidity under high temperatures and pressures.
- **STRENGTH AND DURABILITY** — Unaflo forms a strong, tight seal after the retardation period . . . highly resistant to attack by sulfate waters.

Today, more and more oilmen are choosing Unaflo to assure protection on high-temperature, high-pressure cementing jobs. They get a safety margin and strength they can count on in tight squeezes, casing and plug back operations. For top to bottom protection on *your* next project—specify Unaflo.

SEND FOR FREE BULLETIN— Gives general information and typical data tables on Unaflo's well-bottom performance as well as that of our other cements. For your copy write: Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

*"UNAFLO" is the registered trade-mark of the retarded oil-well cement manufactured by Universal Atlas Cement Company

MINNEAPOLIS • WACO • KANSAS CITY • BIRMINGHAM • CHICAGO • NEW YORK
Export Distributor: United States Steel Export Co., New York

Universal Atlas Cement Company

UNAFLO
RETARDED OIL-WELL CEMENT

OIL-FIELD CEMENTS

Unaflo *Retarded* Oil-Well Cement
Resistant to Sulfate Waters
Atlas Portland Cement — Type I
Atlas Portland Cement — Type II
Resistant to Sulfate Waters
Atlas High-Early Cement — Type III

OG-U-133

UNITED STATES STEEL HOUR — Televised alternate weeks — See your newspaper for time and station.

EXPLORATION

Texas Probes Its Offshore Lands

by Frank J. Gardner

EXPLORATION for oil in Texas is rapidly taking a different turn . . . seaward. All up and down the Texas Gulf Coast, a ringing new campaign of gulfward drilling is under way as the Texans take tentative steps out into the open waters of the Gulf of Mexico. Some previous drilling has been done, but the program now shaping up surpasses all earlier attempts to discover the secrets of the gulf.

For years now, Texas oil operators have been exploring with remarkable success the coastal areas, the bays, lagoons, and inlets along the shore, but only one gas-distillate field has been discovered in the open waters; this was Block 245, off Galveston County, found by Stanolind Oil & Gas Co. in 1949. Controversy in the courts over ownership of the "tidelands" arrested further development, and the oil hunters have concentrated on the bay areas pending a final decision.

These bay operations have been good training sessions for things to come, but new and more rugged equipment must now be employed in open-water drilling; going to sea requires a great deal more of the individual and his equipment—and oil men by their own admission are now in the "gadget stage" of offshore experimentation.

Each new day brings another innovation in the oil industry's efforts to conquer the water. The most active center of experimentation to date has been in Louisiana waters, but Texas bids now to seize the initiative. As one driller puts it, "As far as offshore exploration is concerned, we stand today in about the same position we occupied 20 years ago with respect to marsh and swampland exploration."

Submersible drilling barges, aerial tramways, helicopter taxis, floating tank batteries, submarine engine rooms, six-well platforms—these are only a few of the amazing developments accomplished to date. Countless other radically new tools will soon appear, be tested, used, or discarded. Here is a new field of endeavor for the inventive oil mind, and the challenge is being accepted. The shipyards in Beaumont and New Orleans are forging the future of offshore oil, and discounting the "Rube Goldberg" appearance of some things they're fabricating, one can only stand in awe of their achievements up to now.

Texas has lagged behind Louisiana in its offshore development, but today, seven wildcats are drilling, or will start drilling in a matter of days. Three of these are located in the upper coastal area near the Louisiana state line, and four are in the lower coastal or Corpus Christi area. Of the set of seven (see box), only one is beyond the 10½-mile limit of Texas state control; this is Stanolind's 1 State Tract 141 (Lease 31,592) off Galveston County.

Geology in Doubt

Stanolind, then, will take its place as the pioneer on the Texas Continental Shelf, and the results of drilling on Tract 141 will be closely watched, whether productive or dry. Geologists are curious about the structural conditions to be encountered in the shelf area, and opinions vary on the promise actually held out by the Texas portion.

The Continental Shelf, as such, is the shallow platform bordering the coast to a water depth of 600 ft. Off Texas, it varies in width from about 45 miles in the Corpus Christi area to more than 110 miles off Sabine Pass. Its subsurface framework is still an enigma to Gulf Coast geologists; idealistically, they'd like to think of it as a continuation of subsurface conditions encountered on shore—a seaward extension of a huge sedimentary wedge. One school of thought, however, and one that may dampen the ardor of offshore explorers if it proves to be correct, postulates the existence of a deep, narrow trough along the northern shore of the gulf. Present evidence, which is of course limited, indicates, though, a continuation of shore conditions to at least a 25-mile limit; it would seem safe to assume that for that distance, we may expect a happy hunting ground for oil, with stratigraphic and structural conditions of accumulation strongly resembling those in our onshore fields.

Structurally, the salt-dome uplift has been the principal target in seismic explorations offshore; but it is not unlikely that faults, anticlines, and stratigraphic shore-line type traps will eventually outnumber the submarine salt domes. The Gulf Coast geologist is going to have to learn a new and important Late Cenozoic section; petrophysics will become the most important tool in his kit, and he is going to have to rely on new evidences currently considered unimportant.

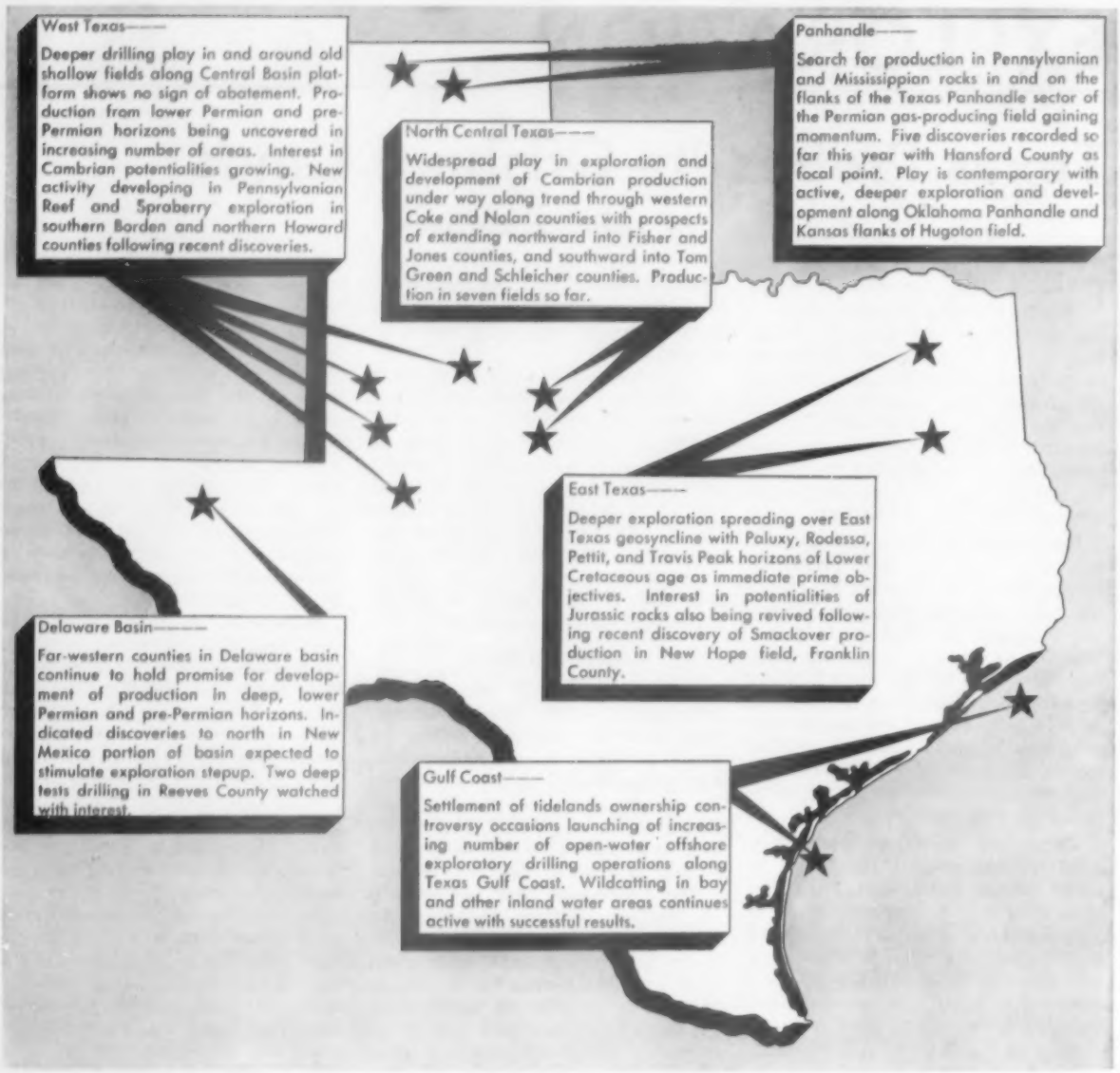
Within a 50-mile belt parallel to the Gulf Coast, Texans have discovered more than 200 oil fields, including 42 proven salt domes, 20 probable salt domes, and 26 possible salt domes; from these fields, they have withdrawn about 2½ billion barrels of oil.

A 25-mile belt parallel to the Gulf Coast, bu **under water,** might easily contain a similar store of oil. Texans think the gamble is worth while.

CURRENT OFFSHORE OPERATIONS—TEXAS GULF COAST

County, operator, lease, and location—	Contract depth (ft.)	Water depth (ft.)	Distance offshore (miles)	Status
Aransas: Humble Oil & Refining Co. 1 State Tract 794, 15 mi. NE of Port Aransas	12,000	50	3½	Location
Galveston: Stanolind Oil & Gas Co. 1 State Tract L-141, Lease 31,592 (Federal Lease OCS 0273), 25 mi. E of Galveston	(?)	50	19	Location
Galveston: The Texas Co. 1 State Tract 137, 6 mi. SW of High Island	10,500	35	2¾	Location
Jefferson: Magnolia Petroleum Co. 1 State Tract 10, 10 mi. SW of Sabine Pass	13,000	(?)	¼	Location
Kenedy: Sun Oil Co. 1 State Tract 1018, Dunn-McCampbell fee*, on Padre Island	8,000		½*	Location
Kleberg: Standard Oil Co. of Texas 53 State Tract 948, 30 mi. SW of Port Aransas	10,000	38	1½	Drilling
Nueces: Gulf Oil Corp. 1 State Tract L-774 (Lease 41,321), 22 mi. SE of Corpus Christi	11,000	50	7½	Drilling

*Surface location on Padre Island, bottom-hole location offshore.


West Texas——
Deeper drilling play in and around old shallow fields along Central Basin platform shows no sign of abatement. Production from lower Permian and pre-Permian horizons being uncovered in increasing number of areas. Interest in Cambrian potentialities growing. New activity developing in Pennsylvanian Reef and Spraberry exploration in southern Borden and northern Howard counties following recent discoveries.
North Central Texas——
Widespread play in exploration and development of Cambrian production under way along trend through western Coke and Nolan counties with prospects of extending northward into Fisher and Jones counties, and southward into Tom Green and Schleicher counties. Production in seven fields so far.
Panhandle——
Search for production in Pennsylvanian and Mississippian rocks in and on the flanks of the Texas Panhandle sector of the Permian gas-producing field gaining momentum. Five discoveries recorded so far this year with Hansford County as focal point. Play is contemporary with active, deeper exploration and development along Oklahoma Panhandle and Kansas flanks of Hugoton field.
East Texas——
Deeper exploration spreading over East Texas geosyncline with Paluxy, Rodessa, Pettit, and Travis Peak horizons of Lower Cretaceous age as immediate prime objectives. Interest in potentialities of Jurassic rocks also being revived following recent discovery of Smackover production in New Hope field, Franklin County.
Delaware Basin——
Far-western counties in Delaware basin continue to hold promise for development of production in deep, lower Permian and pre-Permian horizons. Indicated discoveries to north in New Mexico portion of basin expected to stimulate exploration stepup. Two deep tests drilling in Reeves County watched with interest.
Gulf Coast——
Settlement of tidelands ownership controversy occasions launching of increasing number of open-water offshore exploratory drilling operations along Texas Gulf Coast. Wildcatting in bay and other inland water areas continues active with successful results.

Texas Exploration Up 18 Per Cent

by Neil Williams

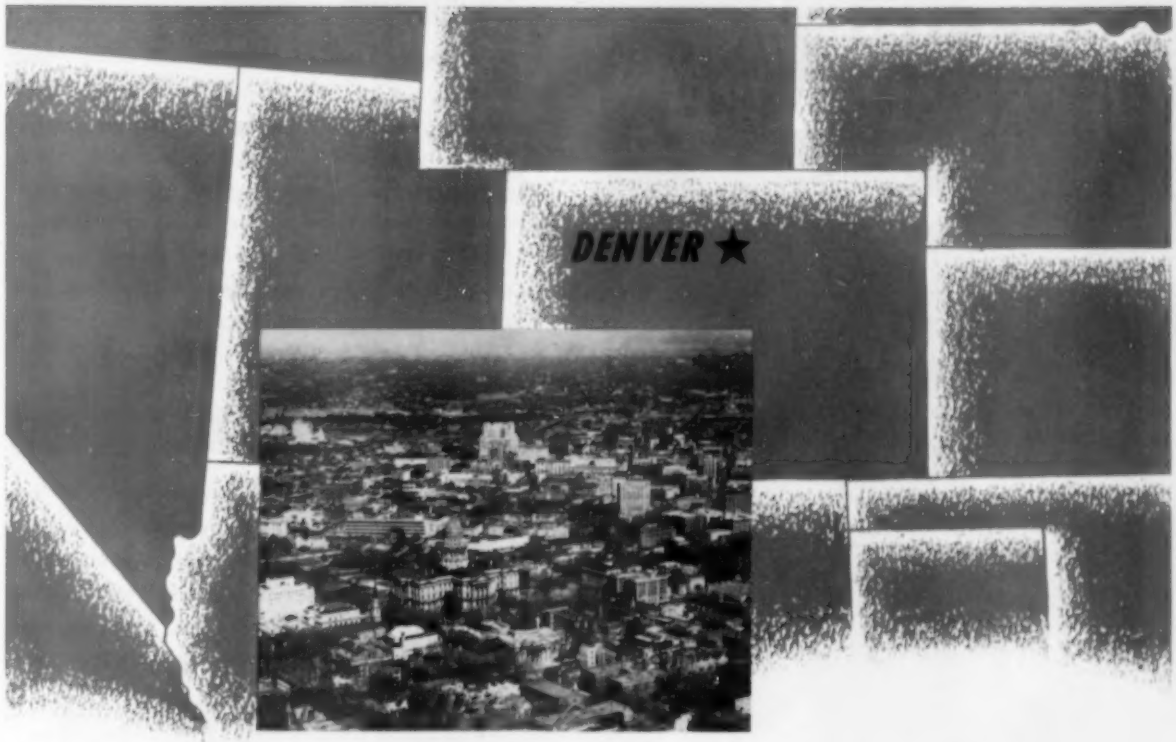
TEXAS leads the nation in exploration activities; during the first 4 months of 1954 the state had 346 successful wildcats out of a total of 1,885 tests. This drilling constitutes nearly 50 per cent of the total exploratory activities in the entire United States and shows an increase of 18 per cent over the same period in 1953.

Seismic activity is keeping pace with the upsurge in exploratory drilling. At the present time there are 222 crews working in the state, or about one-third of the total United States crews. This compares favorably with the 1953 activities when 32 per cent of the domestic seismic work was carried out in Texas.

Hottest area in the state is the recent Cambrian production in Coke and Nolan counties. This play already extends over a 50-mile trend and indications are that production will extend north into Fisher and Jones counties and south into Tom Green and Schleicher counties. Seven fields are now producing from the Cambrian.

Settlement of the tidelands issue has created new interest in offshore operations, and the outlook for the Texas Gulf Coast is exceedingly bright. Exploration and development costs offshore are double or triple those of land operations, but prospects of prolific Tertiary production justify the risks. (See previous page.)

Texas Panhandle . . . Successful exploration in the Texas Panhandle is at an all-time high with five new discoveries in 1954. Most active area is Hansford County where Strawn, Topeka, and



SSC's DENVER DISTRICT OFFICE

Here is another SSC District office to serve you.

In keeping with SSC's policy of providing adequate seismic and gravity service to follow the "oil play," SSC has opened a Denver District Office.

This office will supervise SSC's crews operating in Colorado, Utah, Nevada, and Nebraska.

For complete information on seismic or gravity contract rates and crew availabilities contact:

SEISMOGRAPH SERVICE CORPORATION
6001 East 9th Street
Denver, Colorado

SSC

WORLD-WIDE EXPERIENCE

SEISMIC SURVEYS — GRAVITY SURVEYS — PILOT CREWS — LORAC — VELOCITY LOGGING

Seismograph Service Corporation

TULSA, OKLAHOMA, U.S.A.

DON'T TELL *Me* THEY'RE ALL ALIKE!

All so-called "*Neutron*" Logs Are *Not* Alike

There's a radical difference between any Neutron-*Gamma* Method and the exclusive PGAC Neutron-*Neutron* Method of logging your well. Consequently, interpretations also are often radically different!

CONSIDER THIS EXPERIENCE

After many years of research, PGAC . . . and PGAC alone . . . perfected Neutron-*Neutron* Simultaneous Radiation Logging and started regular field service early in 1950. That was almost four years — plus successful experience on many thousands of wells — before any other ***simultaneous*** logging method was introduced throughout the oil fields as a ***"new development."*** But there is a much more important factor to remember if a Neutron log is to truly "point the way" . . .

REMEMBER THIS DIFFERENCE

PGAC, and only PGAC, can use the pure Neutron-*Neutron* method. This method has consistently proved superior because it ***absolutely eliminates*** the recording of "foreign" or unwanted *Gamma* rays which are ever-present and a risk-of-error factor in any Neutron-*Gamma* method of logging.

WRITE FOR THE FACTS

Write PGAC, P. O. Box 1435, Houston, Texas, and ask for your copies of publications proving WHY all so-called "Neutron" logging methods are NOT alike. They are ***free,*** and without obligation of any kind!

That Guy Is Not As Crazy As He Looks!

PGAC-545

PGAC PERFORATING GUNS ATLAS CORPORATION

Houston, Texas Telephone: LYnchburg 4161

General Offices: 3915 Tharp St. — Sales Office: Melrose Bldg. — Main Plant: 7730 Scott St.

31 PGAC OFFICES ALWAYS READY TO SERVE YOU . . . CALL THESE TELEPHONE NUMBERS FOR PROMPT SERVICE

TEXAS: Houston, LYnchburg 4161 — Corpus Christi, 3-1324 — Dallas, RAndolph 2943 — Longview, Plaza 9-4486 — Alice, 4-3424 — Mission, 5-1687 Abilene, 2-4172 — Gainesville, 2517 — Odessa, 6-6429 — Beaumont, 2-4263 — Victoria, 1023 — Graham, 1728.

LOUISIANA: Shreveport, 3-1648 — Lake Charles, 4724 — Lafayette, 4-2396. KANSAS: Great Bend, 4306 or 4307. NEW MEXICO: Hobbs, 3-2015.

OKLAHOMA: Oklahoma City, CEntral 2-5342 — Pauls Valley, 1577 — Seminole, 2938 — Healdton, 77 — Ardmore, 857.

AFFILIATE COMPANIES: CANADA—Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY—Atlas Deutsch-Amerikanische Olfelddienst G. m. b. H.; Kiel

Morrow production has been tapped in and near the East Gruver field.

Humble Oil & Refining Co. has had three discoveries and one confirmation test since the first of the year. Its 1 Jackson opened East Gruver field with production from the Douglas (Topeka) with an initial production of 6,000 M.c.f. of gas per day. The well lies 10 miles east of Hugoton gas field and the producing zone is about 2,000 ft. below the upper Permian production in the old gas-producing area at Hugoton. Gruver field was confirmed by the Humble 1 Wilbanks.

Since Humble's discovery at East Gruver, there have been three additional discoveries in this area, The Texas Co. 1 Blackmore, a Morrow sand gas-distillate well, Humble 1 Collier, another Douglas discovery opening Hitchland field, and the R. H. Fulton 1 Matthews, a Morrow sand gas discovery.

On the west side of Panhandle gas field in Sherman County, Humble opened a new field with production from the Cisco.

Most of the recent Panhandle production is from deeper zones than the upper Permian gas pay of the old Hugoton field. These new discoveries have revived interest in this area, and the outlook for additional production along the flanks of the old producing area is excellent.

West Texas . . . During 1953 lower Permian and pre-Permian discoveries highlighted exploration activities in West Texas, principally in Andrews County. Since then this play has spread along the Central Basin platform fields into Crane, Ector, and Gaines counties.

Drilling below Pennsylvanian reefs has resulted in a Siluro-Ordovician discovery near Vealmoor field in northwestern Yoakum County. Reef exploration has been revived by production around older fields in Howard, Borden, and Kent counties.

One of the principal targets is the Ellenburger with six important discoveries in 1954; successful operators in this play are Ralph Lowe, Inc., and H. L. Hunt. Ellenburger gas production at the Puckett or Glenna field has turned the spotlight on western Pecos County.

In southwestern Borden and northern Howard counties new production is indicated from the Spraberry sand and from the Pennsylvanian reef.

Interest in the Cambrian production of Coke and Nolan counties has affected West Texas exploration efforts. Wells were previously abandoned in the Ellenburger; now, however, farsighted operators will not condemn a prospect until the well has reached the granite.

Delaware basin . . . Texas' last exploration frontier is the Delaware basin, and possibilities for future production are good in spite of the discouraging results of the past.

At the present time there are 25 oil fields and 2 gas fields with most of the production confined to Permian sands of the Bell Canyon or Delaware formation. The basin covers 10,000 sq. miles and has only 100 sq. miles of producing acreage.

During 1954 the Delaware basin has had only one discovery, the Magnolia Petroleum Co. 1-B University in Ward County; this well was completed in the Delaware sand at 4,978 ft. after logging 54 ft. of pay.

A steady but not spectacular drilling program is forecast for the Delaware sand production. The basin needs a successful pre-Permian wildcat to kick off an active exploratory drilling program. Nearest approach to this has been Continental Oil Co.'s recent blowout in southeastern Lea County, New Mexico. Gulf Oil Corp. and Phillips Petroleum Co. are currently drilling a key well in Reeves County on a large seismic anomaly.

North Central Texas . . . Cambrian production, discovered in 1953, has assumed a role of major importance in Texas exploration. At the present time there are seven fields producing from this zone and operators are reexamining every dry hole bottomed in the Ellenburger.

Exploration for new Cambrian production is difficult because of the major unconformity at the base of the Pennsylvanian. Structures at Cambrian level may be completely masked by this unconformity and as a consequence are not reflected in the overlying Pennsylvanian formations.

Ultimate recoveries in excess of 1 million barrels are forecast for some of these Cambrian wells.

North Central Texas is one of the most active areas in the state from a development standpoint. Exploration drilling is steady, but quiet, apart from the Cambrian play in Coke and Nolan counties. Oil Creek and Ellenburger production has made Grayson County a hot area for the past several years. Caddo production has stimulated wildcatting in Montague and Nolan counties.

Independent operators are very active because of the shallow depths and multiple pay zones in North Central Texas.

East Texas . . . Deeper pays in and around the older producing areas are attracting operators to East Texas. Paluxy, Glen Rose, Pettit, Travis Peak, and Smackover are now the principal targets, replacing the fabulous Woodbine of East Texas field.

In New Hope field, Tide Water Associated Oil Co. chalked up a new-zone discovery in the Smackover limestone with its 1 Ramey, and this deep production at 12,000 ft. has been confirmed by a subsequent test.

Development drilling in East Texas is centered in Panola County within Carthage and Bethany gas pools. Initial potentials of 90 M.M.c.f. of gas per day with a high distillate content are common from the Pettit limestone in these fields.

Gulf Coast . . . The Continental Shelf constitutes what is possibly one of the Gulf Coast district's greatest remaining realms for development of new oil and gas reserves. Exploration of this vast area, long delayed by the difficulties and costs involved, and particularly within the last several years by the tidelands controversy just now is beginning to get under way in earnest. With settlement of the ownership controversy by the recent passage of the Submerged Lands Act, operators now feel free to extend their wildcatting to that area.

Since settlement of the ownership claims, work has been started on seven drilling projects located in the open waters of the Gulf of Mexico off the Texas Coast. Three of these are off the coast of Jefferson and Galveston counties, in the upper coastal area. The others are off the coast of Aransas, Nueces, Kleberg, and Kenedy counties, in the lower coastal area. Locations range up to 20 miles offshore.

Although current new and impending operations in the open waters of the Gulf of Mexico are of particular interest, exploration on shore both in bays and other inland waters and on land, is not being neglected. Despite the extensive and widespread development of the past, potentialities for new exploration along the coastal region are considered far from exhausted, as evidenced by the numerous discoveries still being made, of both new fields and deeper horizons in and around existing fields.

Exploration trends . . . Texas in 1954 is in a much better position so far as reserves are concerned than it was in 1879. At that time, eastern bankers refused to invest in Texas oil properties because they concluded that there were not enough reserves to justify the risk.

Today the present trends in land exploration are aimed at finding deeper pays in and around known producing areas, extending structural trends, defining stratigraphic traps, and mapping areas with the seismograph that pre-

Don't buy
a pump . . .

buy a
Marlow

sold and
serviced
throughout
the world!

MARLOW PUMPS • RIDGEWOOD, NEW JERSEY
Division of BELL & GOSSETT COMPANY

viously were considered too difficult to work, such as the Edwards Plateau. Recent discoveries in the Smackover, Ellenburger, and Cambrian and the coastal waters indicate that Texas will continue to maintain a dominant role in the petroleum industry.

OKLAHOMA

Beaver Confirmation Swabs Oil in Marmaton

In Beaver County at (A on map), J. M. Huber Corp. 2 Potter, NW NW 26-6n-21eCM, northwest offset and confirmation well to the 1 Potter Maramaton oil discovery in Light field, swabbed 4 bbl. of oil hourly from open hole. A drill-stem test was taken at 5,622-58 ft.

Mississippian Gas Strike Reported in Beaver Area

The Texas Co. has a new Mississippian gas pool in Beaver County 4 miles southwest of Northwest Knowles field.

The 1-A Barby, NW NW 2-4n-25eCM, was completed flowing 6,000 M.c.f. of gas per day from perforations at 6,752-64 and 6,776-86 ft. following acidization (B on map).

The shut-in gas discovery is about 5 miles southeast of Sinclair Oil & Gas Co. 1 Maple, a 1952 Mississippian gas strike. No additional development has taken place in the area, however.

Texas Panhandle Hansford County Area

Humble Oil & Refining Co. 1 Hitchland Gas Unit 2 (Frazier), Section 24, Block 1, WCRR Survey, 4½ miles southeast of Hitchland and 2¼ miles northeast of Hitchland field Pennsylvanian production, is an indicated oil producer.

Humble's 1 Hart, 4½ miles southeast of Hitchland and ¾ mile northeast of the discovery at Hitchland field, pumped 4 bbl. of oil per day from the Douglas sand. Gas-oil ratio is 400:1. This is the confirmation to the Hitchland oil discovery. The field is also a gas producer.

Humble 1 East Gruver Gas Unit 4, 5 miles east of Gruver and 1¼ miles northeast of the Humble 1 East Gruver Gas Unit 1, Douglas sand gas discovery for new East Gruver field, is testing as an indicated oil discovery.

The well flowed some oil from the Strawn.

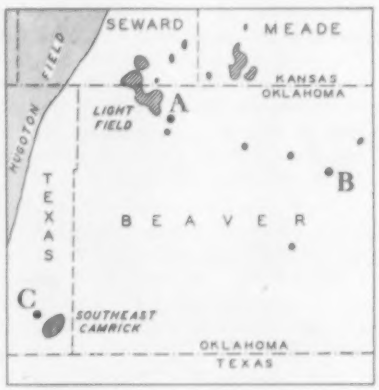
High Flow Rate Reported At Tillman Discovery Well

S. D. Johnson 1 Maguire, SW SW NE 3-3s-19w, flowed 416 bbl. of oil in 23 hours and 40 minutes to open a new pool in Tillman County, southwestern Oklahoma.

The flow was on ½-in. choke for 9 hours, and for 14 hours on 14/64-in. choke. Gravity of the oil is 49.8°. Production is from Strawn perforations at 4,952-62 ft. The new pool is 1 mile north of Southwest Frederick pool, opened last summer by Johnson at 1 Parris, SW SW NW 10. It flowed 80 bbl. of oil in 24 hours from Arbuckle detrital pay. The 1 Cassidy-Watson, NE NW SE 3-3s-19w, southeast offset to the 1 Maguire, is drilling below 3,500 ft.

Camrick Area Gets New Extension Strike

The Texas Co. 1-B Silsbee, NW NW SE 8-1n-19eCM, 2-mile northwest extenson to Texas County's Southeast Camrick Morrow field, flowed an estimated 10,000 M.c.f. of



gas per day on straddle packer test of the Morrow sand at 6,570-6,600 ft. (C on map.)

Across Texas County testing continued at a 2-mile south extension to Northwest Eva field, another Pennsylvanian producer in the Oklahoma Panhandle. The Texas Co. 1-A Dencker, 23-4n-10eCM, 10 miles northeast of Midwell, is an indicated Keyes sand (basal Morrow) producer.

More Pay Tested at Custer County Strike

Magnolia Petroleum Co. 1 Jones, C SE SE 21-15n-16w, Custer County wildcat, flowed 18 bbl. of distillate in 7 hours on a 32/64-in. choke and 2,000 M.c.f. of gas per day on a new test taken at 11,611-697 ft. The pay is believed to be the Springer.

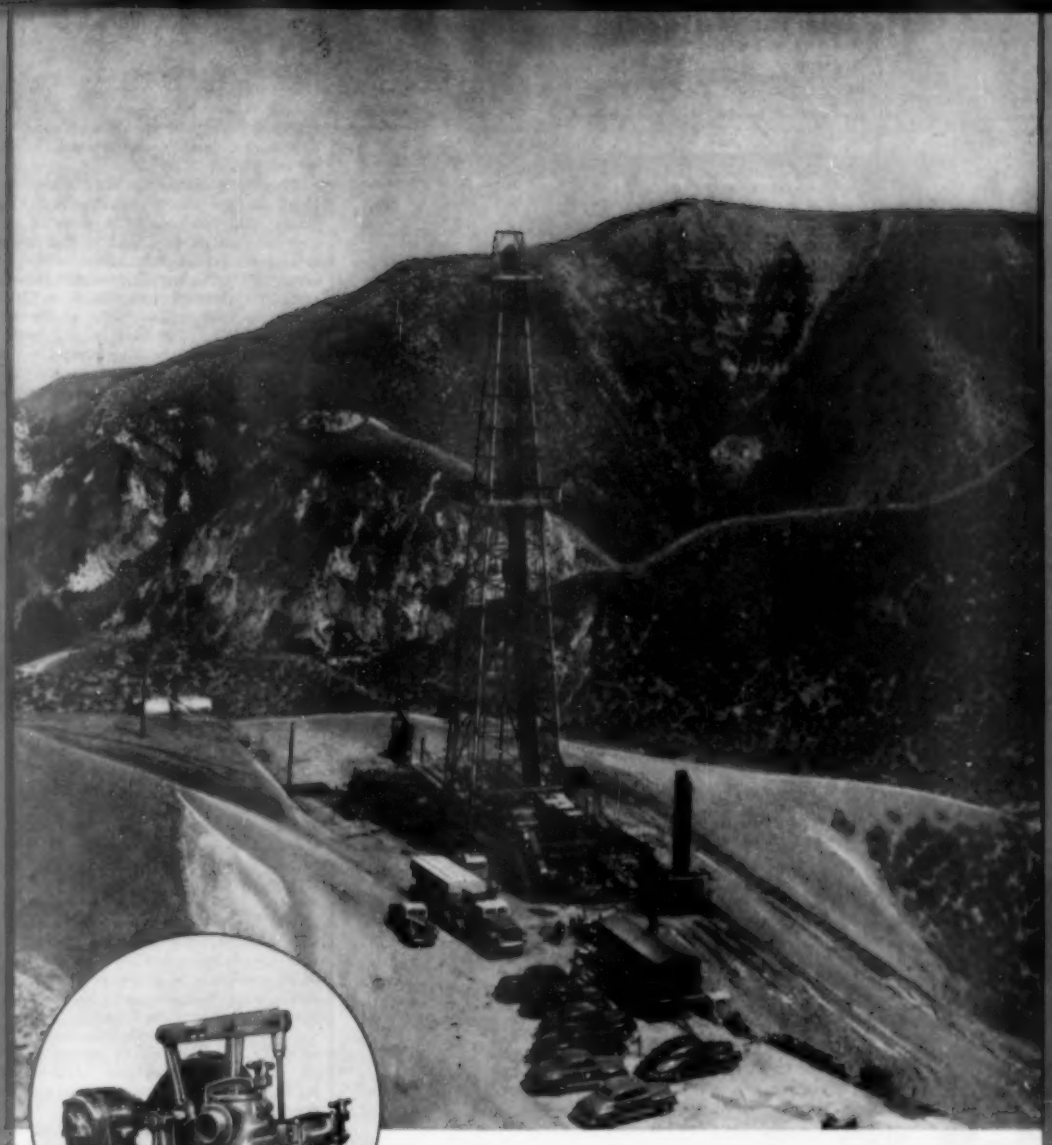
An early test at 11,611-646 ft. flowed 4 bbl. of distillate per hour. This prospective important discovery in the central Anadarko basin area of western Oklahoma is about midway between East Bessie pool in northern Washita County and Northeast Seiling pool in Major County.

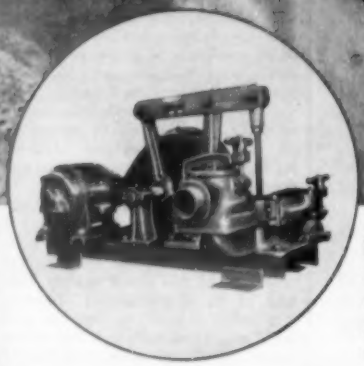
MICHIGAN

Edward Torosian 1 Nerreter, SE SE NE 2-1s-7e, Salem Township, Washtenaw County, showed for from 10,000,000 to 11,000,000 cu. ft. of gas a day from the Trenton early this week at 4,215 ft., present depth. Well is a full mile northwest of the Northville pool Trenton oil discovery well. It is believed that well may be stronger than the last reported gage, but it is almost certain that it is not less than the reported amount of gas.

Top of Trenton was logged at 4,095 ft. First gas, estimated at 50,000 cu. ft. a day, showed at 4,198 ft. Gas continued to show small increases at 10 ft. intervals, until, at 4,290-92 ft., it was gaged at 2,400,000 cu. ft. of gas a day. There were no more recorded gas increases until tools were run back into the hole at 4,315 ft., and after one or two licks, the big gas pay started to show. The gas flow blew out a mercury gage at 12,000,000 cu. ft. on first attempted test of the new open gas flow.

Some free oil was bailed from the hole at 4,285 ft., but since the big gas flow was tapped there has been no evidence of oil.





Rugged equipment for rugged country—no matter where the oil is, you'll find dependable Marlow Self-Priming Centrifugal Pumps around the drilling rig. Operators use these job-engineered pumps for rig washdown, brake cooling water, utility water supply and many other applications.

marlows are durable!

Built especially for oil country use, Marlow Self-Priming Pumps and Marlow "Mud Hogs" make a team that can't be beat. Marlows are "old hands" at oil country pumping. They've proved their durability for majors and independents alike on round-the-clock, trouble-free service. That's why more and more veteran oil men are making Marlows first choice. Make sure with Marlow . . . see your Marlow dealer or write for Bulletin O-53.

MARLOW PUMPS • RIDGEWOOD, NEW JERSEY

Division of BELL & GOSSETT COMPANY

850

an ACCO product

AMERICAN CHAIN

Here's What Swampers Say—

HOUSTON: *"I've used AMERICAN Chain so long I can't remember. You sure don't have trouble with it."*

ODESSA: *"Give me AMERICAN Chain and show me what's to be moved."*

TULSA: *"Who says there's anything better than AMERICAN Chain?"*

These experienced material handlers are talking about two chains AMERICAN designed and made especially for oil field service:

WINCH LINE TAIL CHAINS

A strong, flexible tail chain for wire rope. Made of heat-treated high carbon steel. Specially designed drop forged, alloy steel hook won't damage rope. Four sizes for trucks, tractors, and all other winches.

BOOMER CHAINS

For holding loads and winching, hoisting, or towing. In 20-foot lengths with ACCO (I-beam type) Grab Hooks. Made from ACCO H.C. High Test chain or Endweldur 125 chain in four popular sizes.

AMERICAN makes chain for every oil field use. Stocks are carried in supply stores throughout the oil fields. Specify . . . and *get* AMERICAN Chain.

ACCO

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

American Chain

Operators planned to kill the gas flow and drill well deeper in the Trenton in quest of an oil pay.

The State Conservation Department appears to be taking the position that this heavy gas flow may be from a gas cap overlying an oil pay, and if this is the case, the reservoir pressure and energy must be conserved to allow for maximum oil production. Other problems face Northville operators now drilling wells in the area. All of the drilling locations in and around the Northville discovery are located on 10-acre spacing patterns. If gas wells are developed and no oil is found, there may be difficulty in getting adequate gas proration allowables to make 10-acre locations for gas commercial. Standard gas well spacing pattern for most Michigan areas, and the basis for withdrawal prorations is 160-acre per gas unit.

CANADA

Gas-Condensate Found At Chip Lake Wildcat

Hudson's Bay Oil & Gas Co., Ltd., has discovered natural gas and some condensate in the D2 zone of Devonian at its Hudson's Bay 1 Chip Lake wildcat in the Beta Lake-Chip Lake region of central west Alberta. This venture, originally drilled as Baysel-H. B. 4-22 Beta Lake, by Bailey Selburn Oil & Gas, Ltd., on farmout from Hudson's Bay Oil & Gas, was taken down as a Madison test to 6,291 ft. by Baysel. H. B. undertook to deepen the venture as a D3 Devonian test, and will own all rights below the Madison.

The 1 Chip Lake well, LSD 4, 22-55-11w5, is 9 miles northeast of Shell's 2 Peers venture that discovered some oil in the Cardium, 19 miles southwest of the Fina-Cities Service 6-7 Greencourt Mississippian oil discovery well and 80 miles west-northwest of Edmonton.

Crew entered D2 at approximately 7,615 ft., or 4,879 ft. subsea (K. B. elevation 2,736 ft.), on the basis of samples. Initial drill-stem test reported was run in top of the D2 porosity from 7,713 to 7,723 ft. for 1 hour. There was a faint initial blow, increasing to a strong blow, with natural gas flowing in 7 minutes, at rate 3,000,000 cu. ft. daily. Crew used an 1,100 ft. water cushion, and recovery consisted of 480 ft. of gas-cut water cushion and 15 ft. of condensate. Flowing pressure was 1,650 psi., while shut in pressure was 3,025 psi. Plans now call for coring an additional 10 ft. of zone and then running a further drill-stem test.

British Columbia . . . Two current drillers in the northeastern sector of British Columbia have both assured their backers of natural gas production from at least one horizon and now both are heading down to test for production from lower zones. One of these new successes is a follow-up to a Mid-Triassic gas discovery chalked up by Pacific Petroleums, Ltd., and associates around 18 miles northwest of the town of Fort St. John, while the other is an exploratory venture, being put-down by Southern Production Company, Inc., approximately 18 miles northeast of Fort St. John.

The Pacific group's new success, Pacific 36, Fort St. John, on LSD 5, 27-85-21w6, indicated commercial natural gas production during initial drill-stem test in the "C" section of the Triassic formation. That zone was topped at 4,952 ft., or 2,288 ft. below sea level, based on K. B. elevation 2,664 ft., and crew ran a 60-minute drill-stem test of interval 4,951 to 4,966 ft. There was a strong air blow when packer was opened and gas flowed to surface in 1½ minutes. Gas was

flowing at a measured rate of 3,780,000 cu. ft. daily 20 minutes after packer was opened and stabilized at 3,690,000 cu. ft. daily.

Pipe recovery consisted of 20 ft. of gas-cut mud. Crew resumed drilling after the one test and at last report was making hole below 5,047 ft.

Southern Production's discovery, Southern Production B-7-1 Atlantic, on LSD 12, 33-85-16w6, chalked up its gas strike in the Permo-Penn. formation, which was topped at 5,835 ft. (K. B. elevation 2,713 ft. Test of interval 5,828 to 5,878 ft., with valve open 60 minutes, flowed gas to surface 9 minutes after packer was opened, at a rate of 126,000 cu. ft. daily. Gas flow built up to a maximum flow rate of 176,000 cu. ft. daily in 10 minutes and subsided to 126,000 cu. ft. daily by end of test. Pipe recovery was 145 ft. of mud.

Saskatchewan . . . Indication of possible oil discovery in the Charles formation of the Mississippian limestone has been chalked up at Canadian Gulf Oil Company's ½ mile east offset to its 9 Quinn Mission Canyon oil and gas discovery well. The prospects for discovery came during a 1 hour drill-stem test that gave a small gas flow and an encouraging recovery of crude oil. This well, on Gulf's freehold Lands, is Gulf 11 Moffatt, LSD 11, 35-3-4w2, 3 miles north of Frobisher railpoint and 7 miles east-southeast of Weyburn.

In an official release Gulf stated that the Moffatt well entered the Charles at 4,481 ft., or 2,543 ft. subsea (K. B. elevation 1,938 ft.), and ran first drill-stem test in that formation from 4,570 to 4,590 ft. for 1 hour. Natural gas flowed to the surface in 3 minutes, at rate 660,000 cu. ft. daily. Pipe recovery was 720 ft. of fluid, including the top 690 ft. which was 50 per cent oil and 50 per cent mud, and the bottom 30 ft that was muddy oil.

Second drill-stem test, from 4,590 to 4,600 ft. gave a faint blow, with no gas and a recovery of 10 ft. of drilling mud. Crew is now coring ahead. The well's next objective will be the Mission Canyon section of the Mississippian which proved to be oil and gas productive at the Canadian-Gulf-Canadian Devonian-Quinn 9 well to the west.

EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula, Quebec Province, the 1 asphalt base on the Galt Brook dome, is deepening steadily below 2,240 ft. Test is in hard formation, with oil seepage continuing from the 1,196-1,202 ft. horizon.

ILLINOIS

In Effingham County Partlow & Cochonour and Leo Light 1 Krass, SW SW NW 11-6n-6e, 10 miles south of Effingham, swabbed and flowed 35 bbl. of oil per hour after acidization of the McClosky lime. This new area is 2 miles from produtcion.

Francis Beard has completed 1 Hopkins, NE NW NE 16-2n-11w, for 45 bbl. of oil per day natural from Waltersburg sand at 1,305-07 ft. at the northeast edge of St. Francisville in Lawrence County. The well is a ½-mile stepout from production.

Don Slape, M. W. McConnell and R. W. Harper, Jr., are pump testing the McClosky at 1 West, SW NW SE 22-4n-8e, 6 miles northeast of Clay City and 2 miles from other production in Clay County. The well swabbed 6 bbl. of oil hourly after acidization.

In Clinton County Chas. K. Stein 1 Louis Stein estate, 36-3n-2w, 7 miles northwest of Centralia on the east edge of Boulder pool, was completed flowing 400 bbl. of oil per day through ¼-in. choke from the Devonian at 2,626-34 ft. natural.

TO COMBAT LOST CIRCULATION

Spongy, flake-like granular material . . . shown actual size.

NEW LOW COST BRIDGING MATERIAL

This spongy, flake-like granular material forms an impervious seal in combating lost circulation. It is a complete bridging material alone, giving good performance with limited usage. Silvaflake will not deteriorate, sour or decay and has no adverse effect on mud properties. It pours readily from easy-to-handle 50-lb. bags. Due to the wide range of particle size and shape and its natural plasticity, Silvaflake forms an effective seal that prevents further loss of mud and/or mud filtrates to fractured and vugular formations. The seal thus formed effectively prevents further hydraulic breakdown of the formation. Other Weyerhaeuser products to combat lost circulation include:

SILVACEL—a fibrous material blended with flat, spongy flakes.

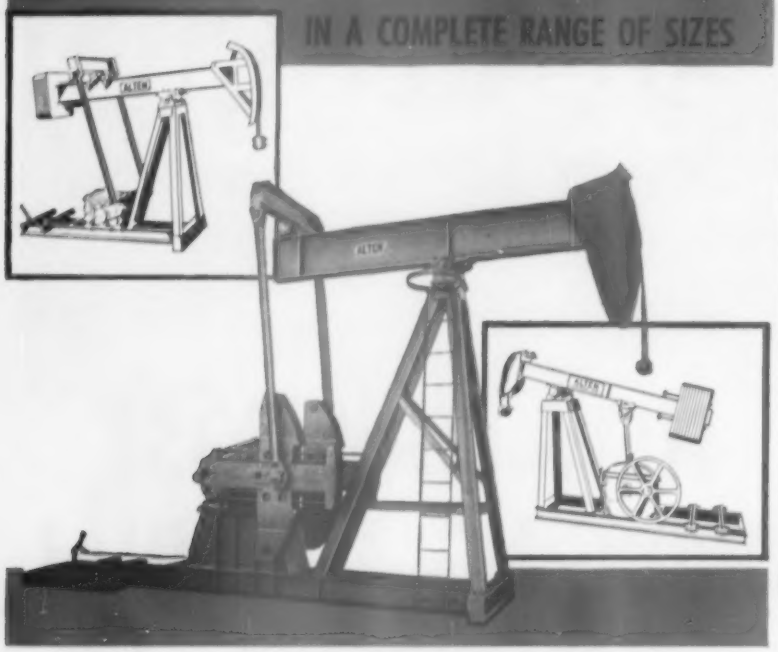
SUPERBRIDGE®—Tough fibers to seal off porous thief formations.

Weyerhaeuser products are available at most supply companies. Write us for more information.

WEYERHAEUSER TIMBER COMPANY
SPECIAL PRODUCTS DIVISION • TACOMA 1, WASHINGTON

ANNOUNCING NEW PRE-TESTED ALTEN PUMPING UNITS

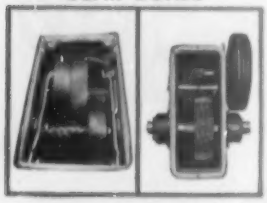
IN A COMPLETE RANGE OF SIZES



Wherever there is a need for pumping oil, Alten has a unit of ample capacity to do the job. *Alten now makes every size and makes it better.* . . . Better because Alten units spend more time operating and less time idled for repairs, maintenance and service. Every part is built for longer life and quick, easy servicing.

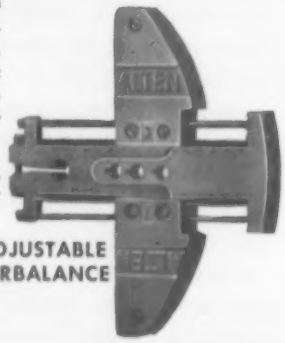
All these features can't be shown on this page, so why not take this friendly suggestion: *Be Sure To Compare Alten Before You Buy!*

TWO GREAT GEAR BOXES



Some pumping situations demand herringbone gears for peak performance, others helical. *Only Alten offers both.* No need to compromise — get the proper gear train every time.

NEW ADJUSTABLE COUNTERBALANCE



Rugged enough to meet harshest oil field requirements, yet so amazingly simple it can be adjusted in minutes by one man on the ground.

Crank calibration locates weights for desired counterbalance. Weights cannot fall during adjustments — they are safely locked in position at all times.

4 WAY ADJUSTABLE SADDLE — BRONZE BUSHED BEARING

Matchless for long wear and convenience. Simply rotate to a new bearing surface and obtain several times ordinary life. Walking beam may be adjusted laterally and to and from the well for exact centering.

BUY FROM YOUR LOCAL SUPPLY STORE

— ALTEN —
Foundry & Machine Works, Inc.
LANCASTER, OHIO

CALIFORNIA

Tejon Ranch Wildcat Yields Good Producer

A 5,700-ft. wildcat completed by Reserve Oil & Gas Co. in the Tejon Ranch area of extreme southern San Joaquin Valley may prove of considerable importance. The new pool opener, a northerly extension test in the central part of the field, rated an initial production of 785 bbl. daily through a 20/64-in. choke. On a 13-hour test through a 17/64-in. choke it produced 29°-gravity crude at a 625-bbl. daily rate.

The successful test was 42-34 Reserve-Pauly in NE NW 34-11n-19w. It is producing from Olcese (Miocene) sands through perforations at 5,657-5,743 ft. This is the deepest pay so far discovered in the field. It is located only one location east of an abandoned well which was not carried deep enough to penetrate the new pay. This is expected to be Reserve's first step in evaluating the new discovery.

Union Completing Shallow Ventura Oil Discovery

In the Piru area of Ventura County and about midway in the 1-mile interval between Torrey Canyon and Oakridge fields, Union Oil Co. was preparing to complete a shallow oil discovery. Drilled to 2,715 ft., 43-4 Oakridge had been plugged back to 1,300 ft. for completion in approximately 250 ft. of pay found below 1,045 ft. The contractor was released by Union after running a combination 5-in. casing string to 1,295 ft. Location of the prospective new pool opener is in SW 4-3n-18w.

Fresno Test Fails

F. M. Taylor, operator, abandoned 34 10F as an unsuccessful attempt to locate oil production 3 miles north of the expanding North Guijarral Hills field, Fresno County. The wildcat, in SW NW 10-20s-16e, was drilled to 9,146 ft. in search of Leda sand production.

Outcome of Los Nietos Co., Operator 78-22 Guijarral Service, a ½-mile north extension attempt will shortly be known. Last week the test was drilling below 8,100 ft., located in SE SE Section 22. In the field proper, where Union Oil Co. and Standard Oil Co. of California have completed seven producers since the pool was discovered last January, the two companies had five rigs at work.

SOUTHEAST NEW MEXICO

Drilling Under Way at Rank Eddy County Wildcat

White Eagle Oil Co. and Stanolind Oil & Gas Co. 1 Welch Unit, 16,000-ft. wildcat in 21-26s-27e, 25 miles south of Carlsbad, was drilling below 2,516 ft. A drill-stem test developed 2 ft. of free oil plus oil and salt water at 2,079-2,105 ft. Elevation is 3,244 ft.

A 1-mile southwest extension to Lazy J field, or a possible link between Lazy J and North Saunders, was seen at Texas Pacific Coal & Oil Co. 1-F State in 35-13s-33e. Drill-stem tests produced oil on two drill-stem tests in Pennsylvanian, or Permo-Pennsyl-

COST REDUCTION CREATES NEW BUSINESS

NEW BUSINESS CREATES NEW WEALTH

BASIC economics proves that business volume increases as unit costs decrease. This increased production potential applies to seismic exploration. Faster, more efficient drilling with Hawthorne "Blue Demon" Bits, in many cases, provides the equivalent in shot hole production of an extra drill . . . reducing hole cost per foot up to 50% . . . reducing profile costs proportionately.

Since the introduction of Hawthorne "Blue Demon" Bits, major companies in West Texas have been able, with the same personnel and equipment, to increase party output more than 100% per month. This increased efficiency has tremendously reduced cost per profile, and has helped to finance new prospects in other areas.

"BLUE DEMON" SAVINGS WILL SUPPORT FUTURE DRILLING PROSPECTS

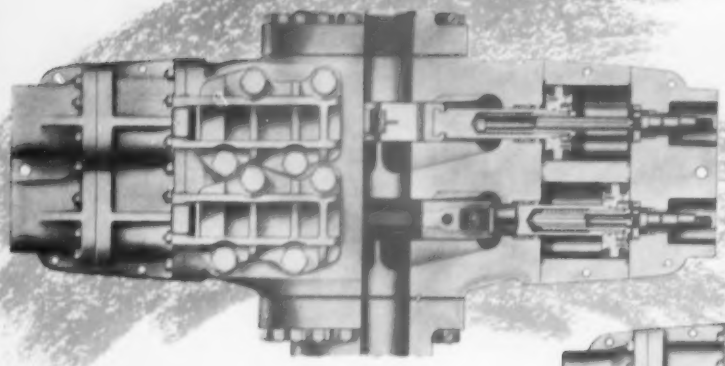
Drilling conditions will vary, but you can count on decreased costs per profile . . . increased party potential . . . in increasing crew efficiency with "Blue Demon" Bits.

U. S. PATENTS
2,615,684
2,666,622
OTHERS PENDING

WRITE FOR ILLUSTRATED CATALOG

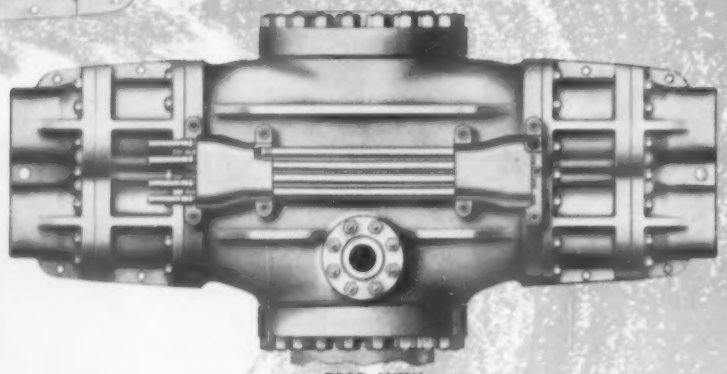
HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS



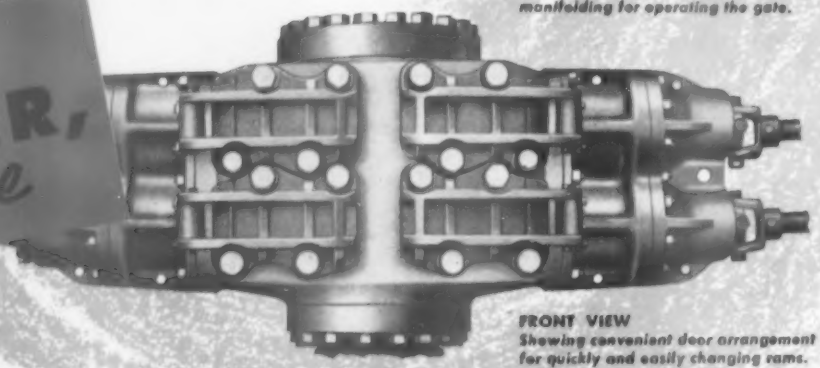
CUTAWAY VIEW
Showing direct hydraulic drive and self-draining ram compartments.

—the industry's Most Advanced cellar control gate



REAR VIEW
Showing simplicity of hydraulic manifolding for operating the gate.

it's **SHAFFER,** *of course*



FRONT VIEW
Showing convenient door arrangement for quickly and easily changing rams.

Here's Why

Shaffer, the organization that pioneered Cellar Control Gates over a quarter-century ago, has continually led in new control gate advancements. And today's Shaffer Hydraulic Cellar Control Gates embody features that are *years-ahead* of the industry—features developed by Shaffer and found in Shaffer Gates *exclusively!*

SIDE-OPENING DOORS are a very important—*and exclusive*—Shaffer advancement. To change rams simply unbolt and swing the doors open—change rams—then bolt the doors shut again. *It's as simple and quick as that!*

But simplicity is only part of the story. There's no need to allow extra space above or at the ends of the Gate to change rams. The doors open across the *shortest* dimension where there's plenty of room to work. Therefore, the compact over-all dimensions give *compactness that really means something* —"fixed-dimension" compactness!

AND ANOTHER IMPORTANT FEATURE is the fact that you can change rams in either compartment of a Shaffer Hydraulic Double Gate without in any way disturbing the other compartment. There's no need to dismantle the upper compartment to change rams in the lower compartment—or vice versa. Each compartment has its own side doors and is completely independent of the other.

And remember—rams in either or both compartments can be changed with equal ease whether the pipe is *in* or *out* of the well!

When you buy cellar control gates you want SAFETY—and no equipment equals the field-proven dependability of Shaffer Gates, built by *pioneers* of such equipment. But don't stop at safety alone—look for the added features that make the big difference in cellar control gates—*the years-ahead advancements you get in Shaffer Gates!*

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1923 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th STREET
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 1788
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 546
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

31 years OF OIL TOOL LEADERSHIP

See your nearest Shaffer representative for complete details — or write direct.

Want a copy of the latest Shaffer catalog? It's free.

See the Shaffer section of your Composite Catalog.

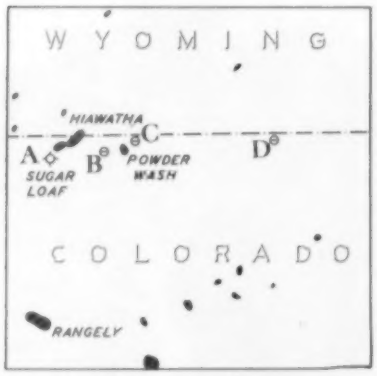
vanian beds, but no gage or estimate of the amount flowed was available. Operators were to perforate casing at intervals between 9,645-9,810 ft.

ROCKY MOUNTAIN

COLORADO

New Morgan County Discovery Indicated

S. D. Johnson, Denver, reported a flow of gas at the rate of 3,000-4,000 M.c.f. per day with a spray of distillate on test of 1 Lind-Bacon, C SW SW 19-3n-57w, Morgan County. The test was of the "D" sand interval 5,515-41 ft. Tool was open 1 hour. Recovery in pipe was 5 ft. of mud and a similar quantity of distillate. Flowing pressure was reported at 675-855 psi. Johnson is reported coring for "J" sand in the wildcat, which is about 4 miles north of Lee pool.



Increased drilling activity in northwestern Colorado has resulted in two new tests beginning. Sunray Oil Corp. has spudded 1 Lookout Mountain in Moffat County southeast of Hiawatha gas field (B on map). The wildcat will go to the Fort Union at 7,500 ft. Quintana Production has a wildcat under way on the east side of the Washakie basin in 12n-89w, a test of Jurassic at Slater Dome (D on map). Forest Oil Corp.-Cosden Petroleum are preparing to test at a wildcat in the East Powder Wash area in 12n-96w (C on map). Mountain Fuel Supply Co. has abandoned the first well in Sugar Loaf field at 1 Sparks Ranch (A on map). Mountain Fuel opened a Mesaverde pool in the area in 1953 and has finaled three producing wells.

New Deep Tests Located

Rogers Oil Co., of Scottsbluff, Nebr. is preparing to spud a Lyons (Permian) test at 1 Love-McFarlan, C NE NW 4-8n-65w, northeast of Black Hollow field in Weld County. The well is to go to about 9,500 ft.

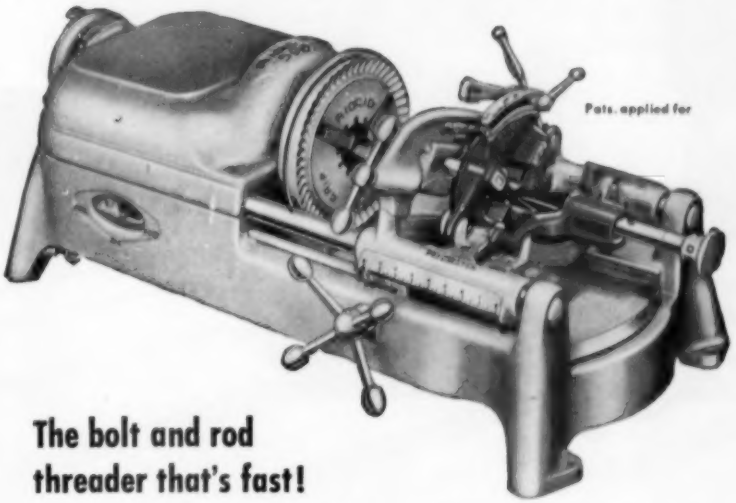
Continental Oil Co. is drilling at 1 Prospect Royalty, C NE SW 3-3n-61w, eastern Weld County, also to test Lyons.

NEBRASKA

Kimball County Oil Discovery Being Completed

Natural Gas & Oil Co. has set casing at 1 Durland, C NE NW 5-14n-55w, Kimball County, and is preparing to perforate for completion as a "J" sand discovery. The well

For Fast Bolt Threading
... it's the New 500A
RIDGID
with new "SPEED-GRIP" CHUCK
New principle ... not just another hammer chuck!



The bolt and rod threader that's fast!
Capacity ¼" to 2" bolts — pipe, too, ⅛" to 2"

You've got to see it and try it to believe it! Only 2 quick-opening die heads—small head for ¼" to 1" bolts, large head for 1¼" to 2" NC, to 1½" NF—to 2½" in 8N, 12N and 16N . . . easy die change, right or left hand threads, easy adjustment to over or under size. Special dies on request. This 500A threads any length bar to 2½" diam., makes studs with RIDGID Nipple Chuck, cuts off ⅛" to 1" rod. Independent operation of tools. Lots of power. New Speed-Grip Chuck guaranteed to hold rod or pipe securely *forward* or *reverse*—motor action makes it tighter. See it, buy it at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U.S.A.

RIDGID
Work-Saver Pipe Tools

FOR A SAFE CASING RUN

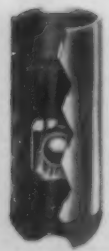
. . . run LARKIN

Larkin
Geyser Shoe

The Larkin Geyser Shoe contains an exceedingly strong, positive sealing, full opening back-pressure valve which will safely handle casing strings of any size or length. The proportioned discharge of the slurry through the peripheral ports evenly distributes the cement around the casing, thus providing the most favorable start toward a successful cement job. The internal construction of Larkin Floating Equipment is of a special formula Bakelite set in carefully cured concrete. It is easy to drill and circulate from the well.

The satisfactory performance of Larkin equipment is demonstrated in a predominant number of wells—each day—in oil fields everywhere.

LARKIN PACKER COMPANY, INC.
ST. LOUIS, MO.



Larkin Regular
Float Shoe

Larkin M&F
Float Collar

Larkin Geyser
Guide Shoe

Larkin Regular
Guide Shoe

LARKIN
. . . Through Your Supply Store

is about ½ mile south of the town of Kimball. There has been very little previous drilling in the township. Drill-stem test of the interval 6,309-20 ft. recovered 3,700 ft. of gas-cut oil in 45 minutes. Recovery also included 90 ft. of heavily oil and gas-cut muddy water, 135 ft. of brackish water and 270 ft. of mud. Flowing pressure was 600-1,400 psi. The operator reported core recovery of more than 15 ft. of very porous and permeable sand with even stain and good odor. Nearest production is at City pool, abut 2 miles to the northwest.

MONTANA

New Wildcats Staked West of Williston Basin

The recent trend to new exploration and development through the area of Montana on the west flank of, or west of the Williston basin has been further emphasized with location of additional wildcats through the central and north-central area of the state. Union Oil Co. and Carter Oil Co. made location for a wildcat at 1 Miller-Tribal, C NW NE 7-33n-6w, about 4½ miles west of production in Cut Bank field. The new wildcat is in Glacier County. It will be a 4,480 ft. test to Madison and lies about midway between Cut Bank and Reagen fields.

In the Landslide Butte area of Glacier County these two operators are drilling below 4,400 ft. at a joint wildcat. The well, 1-544 Tribal, C NW NW 19-37n-8w is 8 miles west of Reagen. This well is also to test Madison.

In the Ivanhoe Dome area of Musselshell County, The Chicago Corp. and Republic Natural Gas Co. have made location for 3 NP, SE SW NE 17-11n-31e. This well is a confirmation to the discovery well in this area, drilled by these operators and completed in Morrison for a 92 bbl. per day initial.

In Fergus County, W. M. and A. P. Fuller with Lion Oil Co. have made location for a 5,900-ft. test of Devonian at 1 Henrikson, C SE SE 25-19n-23e. There has been very little previous drilling in this area. Amerada Petroleum Co. drilled a 1951 failure about 4 miles to the southeast.

Brorson's Second Well Gets More Madison Encouragement

Sun Oil Co. and Phillips Petroleum Co. reported a flow of 136 bbl. of oil per day at 2 Dynneson, C SW SW 29-24n-58e. The well is the second drilled in the Brorson area of Richland County. These operators completed a discovery well in Ordovician and have been testing Madison shows in the second well for sometime. The gage above is from Madison perforations 9,168-9,220 ft.

NORTH DAKOTA

West Tioga Apparent Discovery Testing

Calvert Drilling Co., Northwest Production Co., and others recovered 90 bbl. of oil in 19 hours on pump from Mission Canyon at 1 McGinnity, NW NE 6-158n-95w, Williams County. The well is about 5 miles west of Tioga production. Pure Oil Co. drilled this well in 1952 and abandoned it. It was farmed out to these operators for work over. The apparent discovery is 1½ miles west of Hunt Oil Co.'s 1 Gohrick, SE SE 5-158n-95w, where tanks are being built for further testing. The well flowed 135 bbl. of oil and 2 bbl.

HERE'S *the difference!*

It's that O-Ring, set in a perfectly flat face that mates with another flat face, that makes a YALE Union different from any other. That difference provides you with more features of safety, speed and economy.

The O-Ring seals *positively* against pressure or vacuum; it is impervious to oil and gas, and can be used with safety on most steam lines.

It's the O-Ring, also, that lets you continue using a Yale union even though the metal surfaces become damaged. The flat face lets you work on short lines and connections with greater ease because you do not have to "jump" a lip in order to connect the union.

Economy? You get that because Yale unions seal easier, without hammering or bolting; they stay in service longer and can be "re-newed" simply by replacing the low cost O-Ring.

Buy them through your supply store . . . and use them for greater savings and safety.

HEX NUT
Conventional unions in sizes up to ¼" are available with hexagon nuts.

WING NUT
Wing nut unions are furnished in 1" through 10" sizes, for pressures up to 7500 lbs.

MIS-ALIGNING
Mis-aligning unions are supplied for pressures up to 5000 psi, sizes from 1" through 6".

TWO-PIECE
This modern pipe line union is now regularly available in sizes up to 36". Larger sizes furnished on special order.

YALE MACHINE WORKS

EXPORT: R. S. Stokvis & Sons Company, Inc., New York, N. Y.

Distributed By:
YALE SALES COMPANY
Phone ME-6418 P. O. Box 10192 Houston, Texas

JONES

SUCKER

WHERE QUALITY COUNTS

Pony rods undergo the greatest stress in the string. That's why JONES builds into them the same high qualities which go into every Jones Sucker Rod. For enduring performance... top your string with the best pony rods. Always select JONES.

RODS

PESA

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

LOOK FOR THE GREEN RODS

of water in 12 hours. Production is from Mission Canyon. This well is also a Pure Oil farmout.

Rough Creek Wildcat To Run Casing

The California Co. will run casing for thorough testing at 1 Rough Creek Unit, NW NE 13-148n-98w, McKenzie County. The well is at 10,400 ft. and will drill an additional 100 ft. before setting casing. Several recoveries of oil cut mud, and some distillate were made on drill-stem tests.

Nelson County Wildcat Announced

Oil Exploration Co. of Grand Forks has announced location for 1 Lamb, SW SW SE 33-153n-58w, Nelson County. The wildcat is more than 25 miles east of previous exploration in the Williston basin, and is to go to granite at about 3,000 ft.

WYOMING

Lincoln County Wildcat Drilling Ahead

El Paso Natural Gas Co. and Continental Oil Co. are drilling below 10,650 ft. at 1 Unit, W½ SE NW 11-24n-113w, Lincoln County after tests of Frontier recovered only mud. The operators test the zone 10,236-10,262 ft. Porous sand was recovered in cores of this interval, but no shows were reported. The well will go to Nugget at about 13,000 ft. Some shows were found in Almy at about 3,100 and 3,600 ft.

Niobrara County Discovery Completed

Buck Creek Oil Co. has completed 1 Government, NE SE SW 2-35n-64w, in the South Little Buck Creek area, Niobrara County. Swab recovery of 360 bbl. of oil per day was reported. Production is from Dakota at 4,012-22 ft. The well is about ¾ mile south of production in South Little Buck Creek field, but is on a separate structure.

Steele Creek Wildcat Recovers Mud From Tensleep

Aurora Gasoline Co. and Kingwood Oil Co. recovered mud and water on test of the zone 5,436-64 ft. at 2 Steele Creek Unit, C SW SE 28-46n-82w, Johnson County. Top of Tensleep was found at 5,424 ft. The well had shows in lower Embar and in Tensleep.

Hansen Ridge Wildcat Is Failure

Sinclair Oil and Gas Co. has abandoned 1 Unit, SE SE NW 30-19n-89w, in the Hansen Ridge Unit, Carbon County. The well went to 10,510 ft. and had shows of gas in Frontier. Volume was not commercial on tests. Shows were found in samples and cores of Embar and Tensleep but tests recovered water. The well was the first on the 17,500-acre unit, and is one of a few deep tests drilled through the deeper portion of the Washakie basin.

THE HERCULES ECONOMY
TYPE "E"
CASING HEAD...

ONE OF THE NINE NEW PRODUCTS BROUGHT OUT FOR '54.

Hercules original overhead packing arrangement is used. Slips are hinged together for easy installation. One-Piece Packing Nut is full opening and will pass centralizers. Special notches are provided in top of packing nut to accommodate trimo wrench or pinch bar to screw it down into head. The Hercules Type "E" Head is an economical means of supporting and packing-off casing strings in wells of medium depth and pressure. Will support 4500 feet of 7" casing.

Write for complete information

• SOLD THROUGH ALL SUPPLY STORES

HERCULES TOOL COMPANY

GENERAL OFFICES AND PLANT: TULSA, OKLAHOMA

Export Representative: Oil Field Equipment Co., Inc. • 30 Church Street, New York, N. Y.

the ACID TEST of time will prove the value of
CAMCO
Corrosion Resistant Pipe Fittings

Screwed • Flanged • Butt Weld

Stocked in types 304, 304L, 316 and 347. Other analyses and materials on application.

FLANGES — (Forged to ASA and MSS standards) All flanges furnished with serrated face to insure positive gripping surface. Use of flanges to MSS standards suggested to effect substantial savings in cost.

FITTINGS — All screwed cylindrical fittings to 2" IPS inclusive and all ells, tees and street ells to ¾" IPS machined from forgings at competing cast fitting prices. Sizes over above machined from castings.

Use attached coupon for catalog covering complete line.
MAIL TODAY

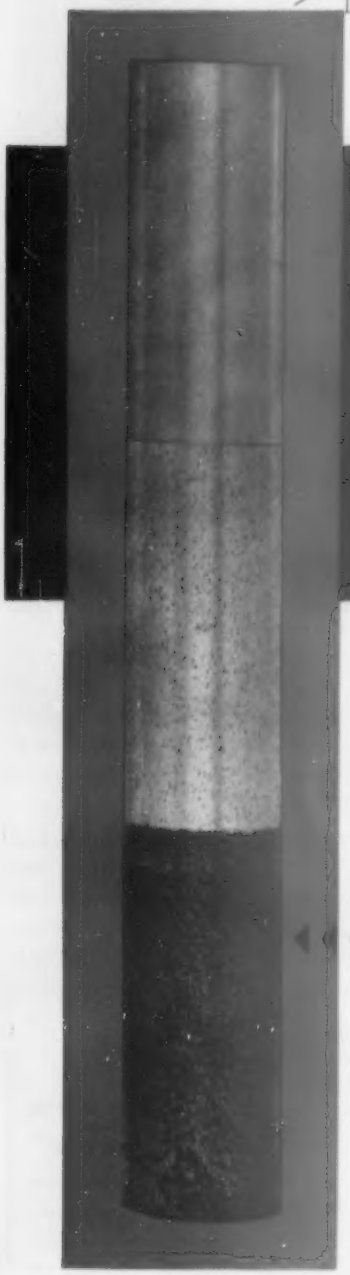
CAMCO Products, Inc. 00
445 State Street
North Haven, Conn.

Gentlemen:
☐ Please send catalog #653 covering Corrosion Resistant Pipe Fittings
☐ Furnish address of area distributor

Name _____
Company _____
Address _____
City and State _____

CAMCO Products, Inc. 445 STATE STREET NORTH HAVEN, CONN.

MORE PRODUCTION at LESS COST!



Pacific Pacilite
(TRADE MARK)
PLUNGERS & LINERS

Used in thousands of pumps in practically every producing area and under the most severe deep oil well pumping service conditions, Pacific Pacilite liners and plungers have definitely proved their superiority. Longer liner and plunger life is assured without sticking or galling; the possibility of cracking or shearing is virtually eliminated. For further details on the Pacific Pacilite process write for Technical Bulletin #201.

The Pacific Pacilite process is a method of control etching the surfaces of pump liners and plungers to form a multitude of minute reservoirs that absorb and retain lubricants. This greatly increased lubrication allows closer fits between liners and plungers and relieves the plating tensile stress. Note dark, dull, rough finish characteristic of Pacilite processed metal. Center surface: .001" below finish; top surface: .005" below finish.

Pacific Pumps inc.
ONE OF THE DRESSER INDUSTRIES

HUNTINGTON PARK, CALIFORNIA
Export Office: Chanin Bldg., 122 E. 42nd St., New York — *Offices in all Principal Cities*
MID-CONTINENT DIVISION: 1221 E. 1st St., Tulsa, Oklahoma
DISTRIBUTED IN CANADA BY: Lucey Export (Canada) Ltd., 1215 9th Ave., Calgary

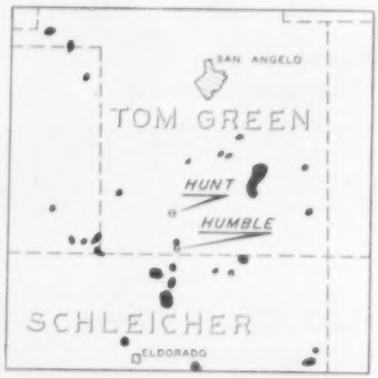
DW-11

TEXAS

WEST TEXAS

Offset Well and Wildcat Flow in Tom Green County

Tom Green County had two heavy producers in prospect, one offsetting a recent field discovery, and the other representing new oil. Both wells are located south of the town of Christoval.



The confirmation well is Humble Oil & Refining Co. 1 Joe Funk, ¾-mile southeast of Stanolind Oil & Gas Co. 1 Hoblett & Jacobs Ranch Co. The Funk test drilled into Strawn porosity at 5,408 ft. and on drill-stem test between 5,408-39 ft., gas surfaced in 2½ minutes, mud in 6 and oil in 7 minutes. After cleaning, it tanked 94 bbl. of 43° oil in 1 hour through ¾ and 1-in. top and bottom chokes. Gas-oil ratio was 512 cu. ft. and flowing pressure ranged from 1,128-1,805 psi. Total depth was 5,464 ft. and a second test was to be made on additional section.

Second drill-stem test in the Humble well was from 5,489-5,514 ft. Gas surfaced in 2 minutes and oil in 5 minutes. Flowing through 7/16-in. choke, the well gaged 108 bbl. in 78 minutes, or at the rate of 76 bbl. an hour. Flowing pressure ranged from 1,615-2,105 psi. Operators reversed out a full string of oil, with no water.

Stanolind 1 Hoblett & Jacobs was a March discovery, flowing 242 bbl. of oil from Strawn reef pay at 5,502-12 ft. Top of the reef was 5,345 ft. on elevation of 2,126 ft. Nearest similar production is the Cox-Brown field, 3½ miles due south in Schleicher County.

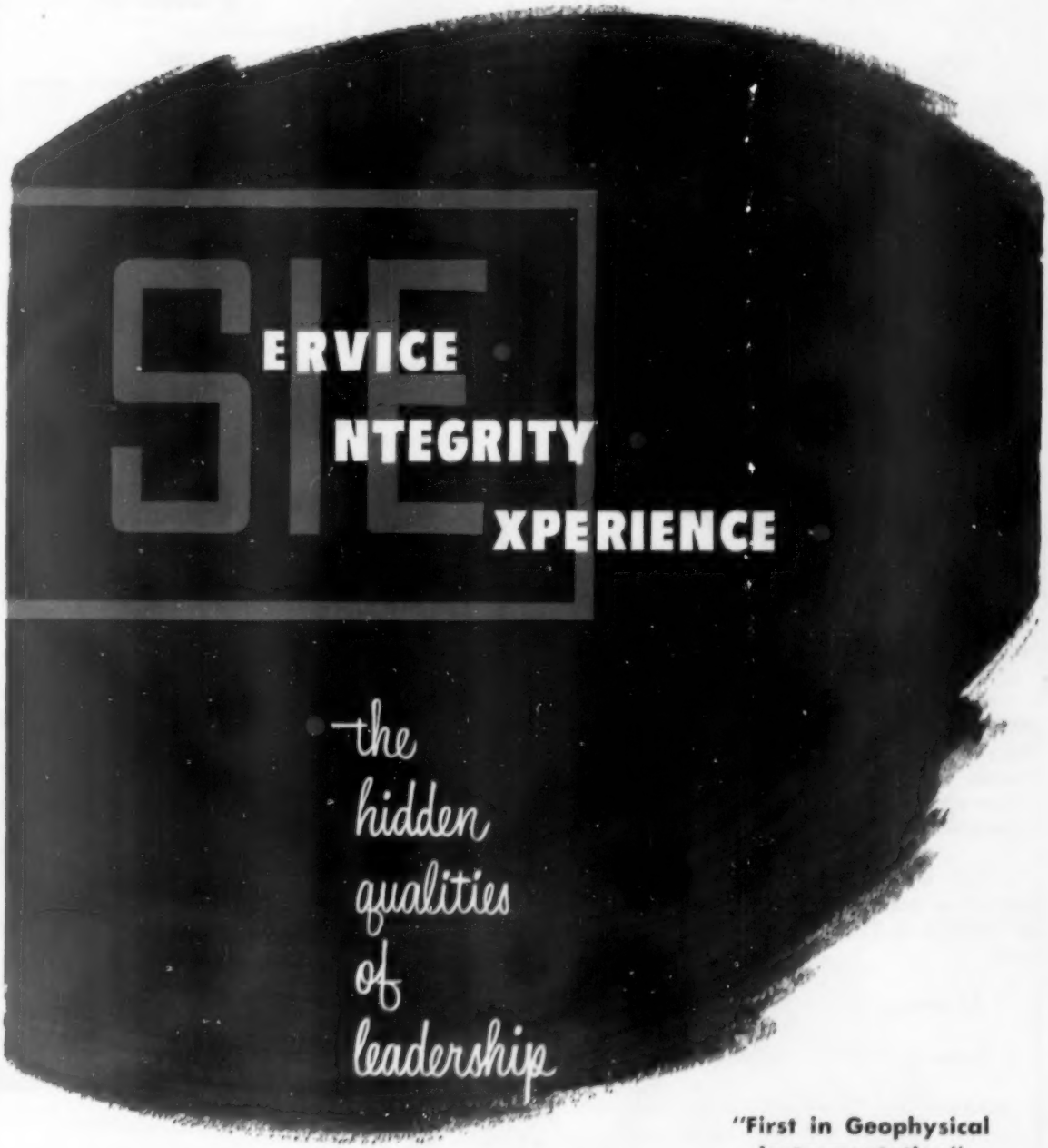
Caroline Hunt Trust Estate 1 Emmett Jacobs, new discovery 1½ miles south of Christoval, and north of Humble's test, was reported to have made a "heavy" flow of oil on drill-stem test of Strawn limestone before being shut in due to fire hazard. There was no gage reported.

No. 1 Jacobs drilled into Strawn porosity at 5,629 ft. on elevation of 2,090 ft. A drill-stem test between 5,629-50 ft. had gas in 2 minutes and oil in 12 minutes. Flowing pressure was 930 psi. and shut-in pressure reached 2,115 psi.

TEXAS GULF COAST

Deeper Pay Zone Opened In Hicksbaugh Extension

Humble Oil & Refining Co. has a new oil discovery in the Hicksbaugh area, Tyler County, where its 5-G East Texas Oil Co. fee is completed with a flow of 160 bbl. of 40°-gravity oil daily through 8/64-in. choke



"First in Geophysical Instrumentation"

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.

2831 POST OAK ROAD • P. O. BOX 13058 • HOUSTON 19, TEXAS

the Permian Basin Oil Show

presents

. . . to the great audience of oilfield workers in the heart of the world's greatest oil-producing region.

More than 95% of the exhibitors from the 1952 show (attendance 110,000) are returning this year. To accommodate them and many new friends, we are moving to a new, improved and larger site. Space demands have exceeded our expectation.

This is *your* opportunity to exhibit *your* product or *your* service to an assured audience of 125,000 to 150,000 right in their own back yard.

As always, it's the Oilfield Workers' Show.

Some space is still available.

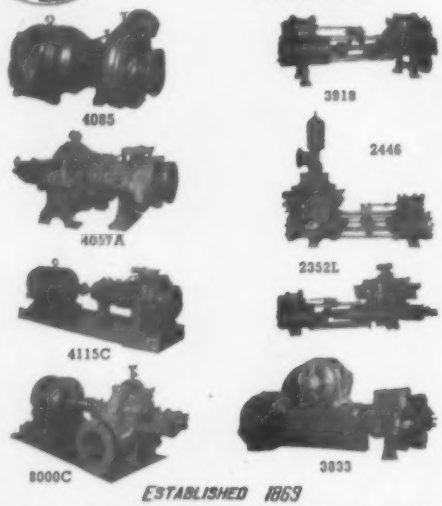
Address The Permian Basin Oil Show, Inc.
219 West Third Street
Odessa, Texas Phone 7-0167

Permian Basin Oil Show

October **14-17,** *1954 Odessa, Texas*

PUMPS

CENTRIFUGAL
RECIPROCATING
BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W. TENTH ST.

The drill string is the most important part of your rig! Lubricate it properly with CLEAN lubricant . . .

Use the **JET-LUBE APPLICATOR**

For Economy—savings up to 50%!
Insurance against Contamination.
Speed of Application. Convenience.

Send for details on JET-LUBE Applicator and "The Inside Story of JET-LUBE Thread and Valve Lubricants."

JET-LUBE INC.

7362 W. BEVERLY BLVD.
LOS ANGELES 36
CALIFORNIA

under pressure of 1,325 psi. and gas-oil ratio of 1,280 cu. ft. per barrel.

The discovery is more than a mile south of production in a deeper horizon than the field's pay. Pay interval is 8,680-90 ft. in Wilcox sand.

KANSAS

Edwards County Has Two New Gas Discoveries

Edwards County on the southwest flank of the Central Kansas uplift has two new gas discoveries waiting on state tests.

Cities Service Oil Co. 1 Wokaty, NE SE NE 25-25s-17w, is credited with a flow of 2,850 M.c.f. of gas per day from perforations at 4,383-4,405 ft. in the conglomerate. Just southwest Sherrod and Apperson are waiting for pipeline connections at their 1 Huff, SE NE NW 31-25s-17w, to reopen McCarty pool. The 1 Huff made 3,286 M.c.f. of gas per day following fracture and acidization in the Arbuckle.

MISSISSIPPI

Deep Test for Gwinville

Lower Cretaceous and possibly deeper horizons are to be explored in Gwinville field with a projected 17,500-ft. test to be drilled by S. W. Richardson. Location for the test, in 24-9n-19w, is in the middle of the field, one of southern Mississippi's major gas-condensate producing areas. Production so far has been from Eutaw-Tuscaloosa sands at depths ranging 7,700 to 8,300 ft.

APPALACHIAN AREA

PENNSYLVANIA

Operations have been started at a new deep wildcat test in Pine Township, Indiana County, Southwest Pennsylvania, by T. W. Phillips Gas & Oil Co. 1 Fee. It is on the Barnesboro Quadrangle approximately 3,000 ft. southeast of Chas. E. Fralich's 1 Charles Lisowitz, .15 mile south of latitude 40 degrees 35 minutes and 1.85 miles west of longitude 78 degrees 55 minutes. Connellsville Township, Fayette County, Peoples Natural Gas Co. 1-4030 F. K. Buttermore heirs, is at 6,394 ft. Cherry Hill Township, Indiana County, Chestnut Ridge Oil & Gas Co. 3 Ralph White, reached 4,170 ft.

WEST VIRGINIA

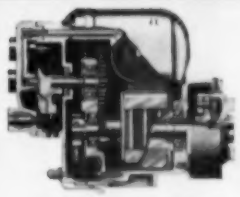
Roaring Creek district, Randolph County, West Virginia, Blaho Oil & Gas Co., has located 1 Mary A. Brown et al, elevation 2,442 ft., Sago Quadrangle, 1.22 miles south of latitude 38 degrees 55 minutes and 1.28 miles west of longitude 80 degrees 00 minutes. St. George district, Tucker County, Natural Resources Corp., after running 7-in. casing in 1-2 Tucker County Court, is drilling at 5,390 ft.

OHIO

Blacksten and Ebersbach have drilled-in their sixth and best gasser in the new pool at Gnadenhutten, on 2 John Zimmerman, Lot 13, Clay Township, Tuscarawas County. Lower Berea sand was topped at 983 ft.,

ROUND the CLOCK OPERATION FOR YOUR PUMPING ENGINES IS ASSURED...

When they're equipped with Fairbanks-Morse Super Spark Magnetos



This is type FM-XOR six cylinder magneto with ball bearings throughout—available in base or flange mounting.

Don't worry about ignition failures when your pumping engines are equipped with Fairbanks-Morse Magnetos—walk away and forget them—they'll keep on running day after day under the toughest oil field operating conditions.

Years of proven service in the oil fields attest to their superior performance and dependability.

- Compact, rugged, self-contained unit—few working parts
- Steady hot spark at all speeds
- Large, long lasting breaker points for quick starts—smooth performance
- Oversize high tension coils—built to take a beating
- Sturdy impulse coupling of simple design for easy starting
- Alnico Super Magnets cast into powerful one-piece magnetic rotor

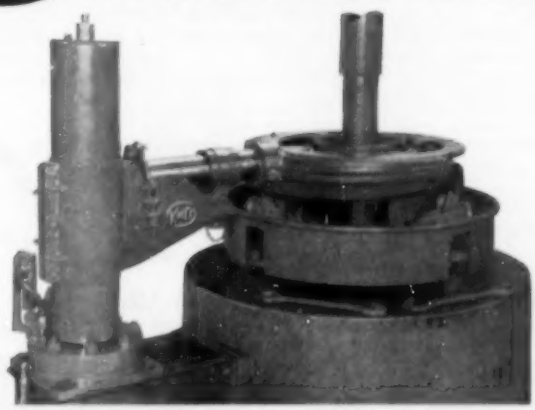
Change now to Fairbanks-Morse Super Spark Magnetos. See your Fairbanks-Morse service station or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

FAIRBANKS-MORSE
a name worth remembering when you want the best

MOTORS • ZC ENGINES • MAGNETOS • PUMPS • DIESELS

KELCO

For Safety Unsurpassed
AIR OPERATED POWER SLIPS



Eight years of complete field satisfaction with major companies and drilling contractors.

Available through your favorite supply stores.
Be Safety Wise — KelCo-ize

Representatives in all principal oil fields

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS
TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS

Qualifying for use on Air Force and Navy aircraft, this 3,000 lb. MIL-AN-6248 hydraulic hand pump, manufactured by GLADDEN PRODUCTS CORP., 635 W. Colorado, Glendale 4, Calif. underwent a test of 70,000 full cycles—only one change of "O"-Rings was allowed, and volumetric efficiency had to stay at not less than 75%. *The pump, however, equipped with Parco "O"-Rings, finished the rigorous test with a remarkable efficiency rating of 97.8%—with no change of "O"-Rings!* Another example of the extra durability of Parco "O"-Rings—it pays off in better products, greater efficiency and lower costs! All dash numbers of AN 6227, AN 6230, AN 6290, MS 29512 and MS 29513 series for commercial or Army-Navy installations to Specifications MIL-P-5516 and MIL-G-5510 are available from stock. Silastics and other special compounds supplied on order.

New 8-page catalog and engineering data on request. Write us today.

Parco

PLASTIC AND RUBBER PRODUCTS CO.

2100 Hyde Park Boulevard, Los Angeles 47, California
3140 West Irving Park Road, Chicago 18, Illinois

and drilling was stopped at 997 ft. with an open flow of 3,500,000 cu. ft. natural.

Preston Oil Co. 2 H. D. Scott, third quarter, New Castle Township, Coshocton County, a north offset to the 7 Ringwalt, made a good showing natural in Clinton, found at 3,331-3,391 ft., and 245 bbl. in 24 hours after fracturing.

S. and M. Oil & Gas Co. 1 Stephen Korns, Section 5, extended the production in north central Killbuck Township, Holmes County, ½ mile to the west. Clinton at 3,248-3,322 ft. flowed 50 bbl. in a 24-hour test 6 days after fracturing.

LOUISIANA

NORTH LOUISIANA

Lower Pettit Gas-Condensate Tested at Caddo Prospect

Jones-O'Brien, Inc. and Ralph Gilster 1 Pace, 7-14n-16w, southwestern Caddo Parish wildcat, has assured gas-condensate production on a drill-stem test of 7 ft. of lower Pettit lime.

The prospective discovery apparently extends Pettit production in Bethany field, northeastern Panola County, Texas, into northwestern Louisiana.

SOUTH LOUISIANA

New Reservoir Uncovered On Iowa Dome East Flank

Richardson & Bass have opened another oil reservoir for Iowa Dome, on the Calcasieu-Jefferson Davis line. Location, on the Jefferson Davis side of the line, is on the southeast flank, a mile from production in the main part of the field, and about the same distance northeast from the comparatively recently opened extension area south of the field.

Discovery well is their 1 Barnes, in 17-9s-6w, completed from sand interval at 10,368-74 ft. Completion gage was 189.46 bbl. of 51.7°-gravity oil in 24 hours through 7/64-in. choke with ratio of 2,631 cu. ft. of gas per barrel of oil. Tubing pressure, flowing, was 3,800 psi.

Lake Athanasio Wildcat Completed as Producer

New oil production has been opened in the Lake Athanasio area of Eloi Bay, in St. Bernard Parish. The discovery has been made by The Texas Co. on State Lease 1940 with a well good for 51 bbl. of 26.9°-gravity oil daily, flowing through 7/64-in. choke with 200-psi pressure and gas-oil ratio of 160 cu. ft. per barrel. Production is from sand at 6,094-6,102 ft. in hole drilled to 9,635 ft.

Second Oiler Completed In North Big Lake Area

Discovery last year by Kerr-McGee Oil Industries, Inc., of oil production in a deep Miocene sand in an area 1½ miles north of Big Lake gas-condensate field, Cameron Parish, is being confirmed in the new area's second test, drilled by Stanolind Oil & Gas Co.

Stanolind's well, 1 Lilly LeBleu, west ofset to the discovery producer, flowed at the rate of 264 bbl. of 34°-gravity oil daily on initial

Technical-Engineering Textbooks

FOR YOUR WORKING LIBRARY

Here is your chance to make additions to your library of popular technical texts. These books are not published by The Oil and Gas Journal, but are offered to you through the Reader Service Department. Look the list over, pick out those that you want and send your order on the blank provided.

"OIL PROPERTY VALUATION"
Paul Paine **$4.50**

Discusses oil properties and oil property interests. Covers unproved lands . . . oil and gas reserves . . . elements in valuation . . . valuation methods. Definitions and explanation make this book useful. 204 pages.

"PETROLEUM GEOLOGY"
E. N. Tiratsoo **$7.50**

A world wide survey of oil lands—with facts on their structural and stratigraphic history. Covers all important principles of modern petroleum geology. 449 pages, 122 maps and diagrams, 8 plates, 2 folders. Technology of drilling fluids described.

"CHEMICAL ENGINEERS HANDBOOK"
John H. Perry **$17.00**

Details of developments in every branch of chemical engineering. Covers technical data, new procedures, modern applications, new equipment, etc. New 3rd Edition has over 2,000 illustrations, graphs, and tables. Thumb indexed. 1,942 pages.

"PETROLEUM REFINERY ENGINEERING"
W. L. Nelson **$10.50**

Gives step-by-step presentation of refining methods—practical details on plant operations. Some of subjects covered are: catalytic cracking, solvent treating, sulfur compounds, ethylene manufacture, additive materials, reboiling, etc., etc. 840 pages, 179 tables, 268 illustrations. 3rd Edition.

"HOW OIL IS FOUND"
Ver Wiebe **$8.50**

Suited to needs of oil operators, lease operators, drilling contractors, tax consultants. Includes seepages, oil rocks, structure, oil accumulation. Describes oil finding techniques fully. 247 pages, 312 illustrations.

"PRACTICAL OIL GEOLOGY"
Hager **$8.00**

New 6th edition. A clear, concise, practical book covering the fundamentals of geology—methods for searching untested areas, selection of sites, application of geology in drilling. This edition carries a section of Veatch's Rule. 589 pages, 227 illustrations, 78 tables.

"STRUCTURAL GEOLOGY OF NORTH AMERICA"
A. J. Eardley **$12.50**

Detailed description of the structural evolution of the North American continent. Double-column pages, 11¼" x 8¼", permit large drawings. Some 750 illustrations and 16 paleotecteonic maps in full colors. 620 pages.

"FIELD GEOLOGY"
Frederic H. Lahee (5th edition) **$8.50**

A complete manual for petroleum and mining engineers and geologists. Presents methods and keys for recognition and interpretation of land forms and structures. Valuable new information on air photography and air photogrammetry . . . underground surveying . . . electronic location. 883 pages, 5" x 7", 630 illustrations.

"AMERICAN PIPE LINES"
George S. Wolbert, Jr. **$3.50**

A thorough analysis of the complicated problem: ownership of pipe lines. Discusses historical, economic, factual development of pipe lines, including specific issues relating to industry rate and service requirements. Surveys existing legal and administrative remedies and decisions of the Interstate Commerce Commission.

"INTRODUCTION OF GEOPHYSICAL PROSPECTING"
Milton B. Dobrin **$8.00**

A practical treatment of the fundamentals, procedures, uses, and value of all the standard methods of geophysical prospecting. For each method discussed, the book covers basic physical principles, instrumentation, field techniques, reduction and interpretation of field data. 435 pages, 65 illustrations.

"FUNDAMENTALS OF RESERVOIR ENGINEERING"
John C. Calhoun, Jr. **$6.00**

A discussion of the application of engineering principles to various phases of reservoir engineering. Arranged in topical order are such subjects as Reservoir Fluids; Reservoir Rocks and Rock-Fluid Systems; Reservoir Principles—Gas Flow, Drainage and Water Influx; and Well Performance Applications. Collected from a series which appeared in The Oil and Gas Journal. 417 pages, 288 diagrams and graphs.

Title of Book	Price
.....	$ .....
.....	$ .....
.....	$ .....
.....	$ .....
Total of Order	$ .....

Payment enclosed ... Purchase order enclosed ... Mail Invoice
(Make Checks payable to The Oil and Gas Journal)

Name .....
Address .....
City ..... Zone .... State .....

Reader Service Department
THE OIL AND GAS JOURNAL
P. O. Box 1260 Tulsa 1, Okla.

rugged

Your Totco equipment is designed and built to take it. Shock . . . pressure . . . heat—none of these affects the accuracy of a Totco.

Even in the deepest and hottest wells your Totco will give continuous, reliable, accurate readings. It's rugged.

BE SURE YOU KNOW, USE

TOTCO

double recorder

Technical Oil Tool Corporation
1057 N. La Brea Avenue,
Los Angeles 38, Calif.

EXCLUSIVE DISTRIBUTORS:

California—The Republic Supply Co. of California
Domestic—The Continental Supply Company
Canada—Oil Well Supply Division United States Steel Company
Export—Lucey Export Corporation, New York City

gage taken through 9/64-in. choke. It had a flowing pressure of 1,300 psi. and gas-oil ratio of 775 cu. ft. per barrel.

The well, drilled to 15,003 ft. encountered deeper sands, one at 13,365-450 ft. being potentially productive of gas and condensate.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: Barry & Moore 2 Ferry, William Dunbar Sur. 305, A-190. Dry. TD 2,336 ft. Elev. 331 ft., Carrizo 2,268 ft.

Carter & Carter 1 Brauchle, CCI&M Sur. 64, A-186. Shut down. TD 4,317 ft.

H & J Drilling Co. 1 Morris, Blocks 778 and 779, Simmons Subd. 1, Survey 39. Dry. TD 2,000 ft.

Bexar County: E. Horner and Leon Glassburg 1 Lemelle, Alphonso Steel Sur. 18, A-662. Dry. TD 2,293 ft.

McMullen County: Argo Oil Corp. 3-G H. C. Edrington estate, AB&M Sur. 63. IP 2,000 M.c.f., open-flow potential, Queen City 1,450-60 ft. TD 9,910 ft. in Wilcox. (New pay in South Campana field.)

Travis County: Robert A. Pfaffman 1 Caruthers, Thomas C. West-Brook Sur. Dry. TD 1,000 ft.

Wilson County: Sutton Drilling Co. 1 Kollodziej, David I. Holt Sur., A-131. IPP 35 BOPD, 42°, Midway 4,211-20 ft. (perforations). TD 4,220 ft.

District 4

Duval County: Argo Oil Corp. 1 Villareal, Lot 1, Block 25, Copita Farm & Garden Tracts Adidtion 2. Dry. TD 6,745 ft.

J. W. Gorman 1 Adami, J. H. Gibson Sur. 349, A-265. Dry. TD 2,289 ft.

Hidalgo County: Clark Fuel Producing Co. 1 Westag, Porcion 42. Dry. TD 6,605 ft.

Jim Hogg County: O. W. Killam 2 Hellen, Duval County School Land Sur. 150, A-365. Dry. TD 3,332 ft.

Jim Wells County: Blanco Oil Co. et al 1 Reed & Lindsay, Lavaca Grant, A-166 Shut down. TD 8,100 ft.

Kleberg County: Erwing A. Branham and J. A. McDonald, Lot 12, Block 64, Henrietta N. King 4th Subd., Riviera Farm Lots. Dry. TD 8,515 ft.

Starr County: Jake J. Hamon and L & W Drilling Co. 1 Montalvo et al, Share 9, La Sal Colorado Grant. Dry. TD 6,874 ft.

Webb County: Harold K. Boysen 1 State, Sur. 2156. Dry. TD 1,245 ft.

TEXAS GULF COAST

District 2

Bee County: Appell Oil & Gas Corp. et al 1 Burrows estate, J. H. Ashby Sur., A-75. Dry. TD 5,410 ft.

Rowan & Hope 1 Impson, I&GN Sur., A-372. Dry. 5,016 ft.

DeWitt County: Argo Oil Corp. 1 Dubose et al, Isaac Baker Sur., A-89. Dry. TD 9,624 ft.

Goliad County: A. B. Alkek 1 Swickheimer et al, Manuel de la Pena Sur., A-31. IP 72 BOPD, 8/64-in., 24°, Frio 3,427-31 ft. TD 4,600 ft. (New field—Alkek.)

George R. Brown 1-B Moore, John Williams Sur., A-287. Dry. TD 4,008 ft.

Jackson County: W. Earl Rowe 1 Westhoff, Elizabeth McNutt Lge., A-46. Dry. TD 7,670 ft.

Live Oak County: F. William Carr 1 Appell, Cameron County School Land Sur., A-146. Dry. TD 8,011 ft.

(District 3)

Harris County: David L. Gordon-Texas Eastern Production Co. 1 Alford, G. W. Childress A-217. Dry. TD 8,014 ft.

Magnolia Petroleum Co. 22 Warren Ranch, HT&B 1 A-411. Dry. TD 12,501 ft.

Panuco Oil Leases, Inc. and Ivy Minterals Corp. 1 Parker et al, Robert Wilson A-88. Dry. TD 10,360 ft.

Orange County: American Republics Corp. and Houston Oil Co. of Texas B-1 H. J. L. Stark, T&NO 9 A-187. Dry. TD 9,262 ft.

Wharton County: N. B. Hunt 1 Kelley estate, A. J. Dunlap 3 A-89. Dry. TD 5,203 ft.

EAST TEXAS

Anderson County: Carter Gragg Oil Co. 1 Davey & Monnig, Robert Erwin Sur., A-263. Dry. TD 5,577 ft.

Cherokee County: Sohio Petroleum Co. 1 Ault, J. Ferguson Sur., A-278. Dry. TD 5,460 ft. Elev. 597 ft., Woodbine 4,868 ft.

Harrison County: Rexall Drilling Co. 1 Green, I. C. Crawford Sur. IPP 19 BOPD, 36°, GOR nil, Goodland perforations 2,338-50 ft. TD 2,426 ft.

Rusk County: British American Oil Producing Co. 1 Lipscomb, Stephen C. George Sur. Dry. TD 7,720 ft. Elev. 428 ft., Paluxy 4,675 ft., Pettis 7,310 ft., Travis Peak 7,528 ft.

Wood County: Ace Drilling Co. 1 Dickson, Elijah Allen Sur., A-8. Dry. TD 6,000 ft.

TEXAS PANHANDLE

Hansford County: Fulton 1 Mathews, 115-45-H&TC. IP 3,025 M.f.g., plus 3 bbl. distillate per 1,000 M.f.g., Morrow sand 7,062-74 ft. TD 7,184 ft.

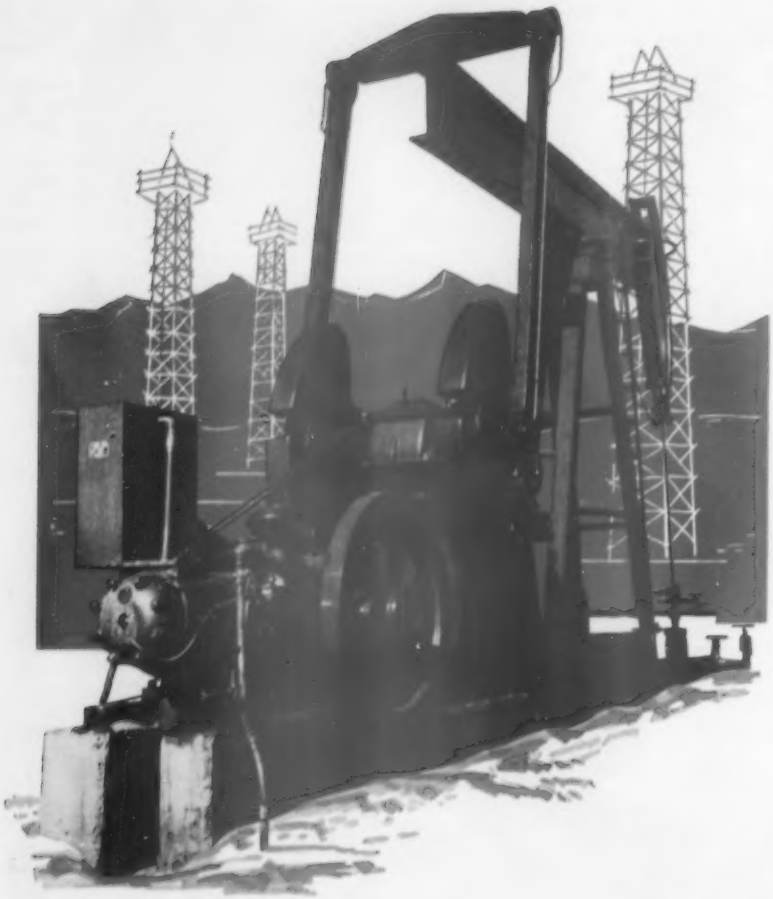
Thompson VIBRATING SHALE SHAKER and SAMPLE MACHINE

WITHOUT proper separation equipment you can experience great losses. No drilling outfit should be without Thompson Shale separating equipment! Abrasives and shale left in drilling muds not only reduce the service-ability of these costly muds, but are damaging to expensive drilling tools. Experience shows that Thompson Shale Shakers actually *save money* these three ways: (1) promotes longer life to drilling tools, (2) reclaims expensive shale and abrasive-filled drilling muds, (3) cuts down idle time caused by re-tooling, and restoring mud solution; plus, giving accurate samples for making foot-by-foot analysis of well.

Manufacturer of FAMOUS THOMPSON ROTATING SHALE SEPARATOR

SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO. IOWA PARK, TEXAS



for sheer guts

YOU CAN'T BEAT A LORAIN!

In any climate, in any weather Lorain engines and compressors have proved that they have what it takes to stay on the job.

What's more, they need little attention. Repairs are easily made on the spot. Even the wet cylinder liners can be changed in the field without special tools or equipment.

Lorain Muti-Fuel Engines are available from 20 to 75 HP. Try one on your toughest job and see the difference.

A-9325

WHITE-ROTH *Machine Corp.* LORAIN, OHIO

WILDCAT COMPLETIONS

Hutchinson County: Phillips Petroleum Co. 1 Roberts, 5-T104-T&NO. Strat test. Dry. TD 3,880 ft.

Roberts County: Gulf Oil Corp. 1 Osborn, Clay County School Land. Strat test. Dry. TD 4,180 ft.

Gulf 1 Byrum, 36-M2-H&GN. Strat test. Dry. TD 4,000 ft.

Wheeler County: Sun Oil Co. 6 Strat-Carwile, 82-A5-H&GN. Dry. TD 3,889 ft.

WEST CENTRAL TEXAS

Brown County: Santa Fe Western Gas & Oil Co. 1 Busbee, Blk. 30, Henry P. Brewster Sur. 780. Dry. TD 1,278 ft.

Coal Tullous & Co. 1 Moore, Sec. 20, Jesse Dickinson Sur. 10. Dry. TD 2,110 ft.

Callahan County: Allen Dykes 1 Warren, Sec. 90, BBB&C Sur. Dry. TD 4,657 ft.

Johnson & Warren 1 Payne, Wm. C. Hays Sur. 18. Dry. TD 1,799 ft.

Coleman County: Howsley & Jacobs 1 Burkett, W. T. Dunlavey Sur. 259. Dry. TD 3,285 ft.

W. H. McCarr 1 Dibrell, J. H. Barkley Sur. 701. Dry. TD 2,380 ft.

W. H. McCarr 1 Johnson, E. G. Moffatt Sur. 232. Dry. TD 1,225 ft.

G. V. Minnick 1 Newman, McKinney & Williams Sur. 328. Dry. TD 2,360 ft.

Jones County: Harry W. Brenan Jr. 1 Gist, Sec. 11, BAL Sur. TD 2,100 ft.

Nolan County: C. L. Norsworthy 1 Williamson, 244-64-H&TC. Dry. TD 6,443 ft. in Cambrian sand.

Stonewall County: North Central Co. 1 Phumphrey, 1-C-AB&M. Dry. TD 6,510 ft.

Skelly Oil Co. 1 Huphreys, H&TC Sur., A-776. IPP 106 BOPD, 40°, GOR very low, pay 4,349-81 ft. TD 6,690 ft.

Woodard & Co. and Dan Auld 1 Boyd, 12-D-H&TC. Dry. TD 6,210 ft.

Taylor County: Onyx Oil Co. 1 Neas, E. Anderson Sur. 81. Dry. TD 1,770 ft.

Robinson Puckett, Inc. 2 Bacon, W. M. Smith Sur. 517. Dry. TD 2,320 ft.

Throckmorton County: Woodson Oil Co. 1 Montgomery, Sec. 166, BBB&C. Dry. TD 5,569 ft. Elev. 1,611 ft., Caddo 4,795 ft., Ellenburger 5,462 ft.

NORTH TEXAS

Archer County: Archer Drilling & Production Co. 1 Goodwin, Blk. 133, John Harris Subd. Dry. TD 1,105 ft.

George Blackerby 1 Shappell, Blk. 8, Robert McKim Sur. Dry. TD 1,829 ft.

M. W. Blair 2 Harmel, Blk. 24, Denton CSL. Dry. TD 680 ft.

Blair 4 Harmel, Blk. 24, Lge. 4, Denton CSL. Dry. TD 674 ft.

E. S. Brashear 1 Steen, Blk. 1, IRR Sur. Dry. TD 739 ft.

Bill Lisle 1 Bishop, Blk. 10, W. E. Probert Sur. Dry. TD 1,437 ft.

Lisle 1 Meade Estate, Blk. 35, W. E. Probert Sur. Dry. TD 1,457 ft.

Lisle 1 Meade Estate, Blk. 40, Probert Sur. Dry. TD 1,450 ft.

Sinclair Oil & Gas Co. 1 Coleman, Brazos CSL Sur., A-18. Dry. TD 4,900 ft.

Carleton D. Speed Jr. 2-B Perkins, Blk. 48, Bell CSL. Dry. TD 1,465 ft.

Carleton D. Speed 1-F Perkins, Blk. 10, A. Ingalls Sur. Dry. TD 1,535 ft.

Baylor County: Bridwell Oil Co. 2 Craddock, Sec. 3, SPRR Sur. Dry. TD 5,427 ft.

Bridwell 2 Hunt Estate, Colorado CSL Sur., A-134. Dry. TD 3,558 ft.

Glenn Cooper and Megargel Drilling Co.

Throughout the oil active areas of the United States and Canada, there is a network of Magcobar Dealers who "anticipate" the mud requirements for your next well months in advance.

These men are not psychic. Rather they are substantial, independent business men in the hundreds of towns and cities which are located near oilfields. They are Magcobar Dealers and they each have thousands of dollars invested in facilities and equipment to handle mud stocks so your well can drill ahead uninterrupted regardless of the mud problems you encounter.

The next time you need mud . . . whether it is a routine order or a midnight emergency to prevent lost circulation, salt water flows, gas blowouts, or any other trouble . . . look for the dealer who sells Magcobar. There are more than 400, conveniently located with respect to drilling activity.

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS
ONE OF THE DRESSER INDUSTRIES

Magcobar

HOW DOES HE

KNOW YOUR WELL WILL

LOSE CIRCULATION

Advanced pipeline transmission techniques call for automatic controls such as the Hydramotor valves illustrated below. These all-purpose heavy-duty electric motor valves regulate gas, air, oil, steam or water. The Hydramotor is only one of thousands of automatic controls made by General Controls for home, industry and national defense. For 24 years General Controls has been designing and building a comprehensive line of high quality automatic control systems.

The General Controls trademark shield on an automatic control is your assurance that it is a product of exhaustive research, sound engineering and careful workmanship. Accurate control . . . fast response . . . long service life. For the best in automatic controls, it's General Controls.

progress through control

GENERAL CONTROLS

Plants In: Glendale, Calif., Burbank, Calif., Skokie, Ill.

Factory Branches in 37 Principal Cities

SEE YOUR CLASSIFIED TELEPHONE DIRECTORY

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

WILDCAT COMPLETIONS

1 Shelley, Blk. 2457, TE&L Sur. Dry. TD 1,589 ft.

Clay County: Bobby M. Burns 1 Thoele, Blk. 2, Clark & Plumb. Dry. TD 5,601 ft.

L. T. Burns 1 Morris, Blk. 35, Freestone CSL. Dry. TD 4,245 ft.

Fain & McGaha 1 Mendenhall, J. J. Hand Sur., A-175. Dry. TD 4,610 ft.

Elmer Frenck 1 Sowden, Sec. 7, MEP&P Sur. Dry. TD 1,819 ft.

Larson & Thomas 1 Hilburn, E. W. East Sur., A-133. Dry. TD 4,760 ft.

Palmer Drilling Co. 1 Garner, Blk. 78, Byers Bros. Subd. Dry. TD 2,372 ft.

Wichita River Oil Corp. 1 Egdorf, Blk. 66, Freestone CSL. Dry. TD 6,100 ft.

Cooke County: Kay Kimbell 1 Locke, McDearman Sur., A-1638. Dry. TD 4,986 ft.

Kimball 1 Ritchey, H. Edmiston Sur., A-354. IPP 67 BOPD, 34°, GOR 100 cu. ft., Strawn 3,191 ft. TD 3,202 ft.

Kimball 1 Sims, A. D. Kendall Sur., A-555. Dry. TD 4,266 ft.

Ralph H. Snuggs 1 Williams, M. Wideman Sur., A-1123. Dry. TD 3,428 ft.

Grayson County: A. B. Harmonson 1 Anderson, R. Haining Sur., A-520. Dry. TD 5,372 ft.

Kay Kimbell 1 Jacobs, F. W. Price Sur., A-981. Dry. TD 7,650 ft.

Sun Oil Co. 1 Cunningham, H. Stewart Sur. IPP 16 BOPD, 23°, Strawn 4,930-40 ft. TD 5,640 ft.

Jack County: Leatherwood Drilling Co. 1-A Carney, Blk. 3, Navarro CSL. Dry. TD 551 ft.

Leatherwood Drilling 1 Martin, Blk. 3, Navarro CSL. Dry. TD 3,282 ft.

C. B. Loftin 1 Loftin, James Williams Sur., A-877. Dry. TD 466 ft.

Frank Wood Associates 1 Graham, TE&L Sur., A-692. Dry. TD 4,607 ft.

Knox County: Ted Weiner 1 Pardo, D. G. Burnett Sur. 13. Dry. TD 5,816 ft.

Wichita County: Paul Bilbrey & Wayne Albritton 2 Brockreide, Blk. 325, Waggoner Colony Subd. Dry. TD 1,657 ft.

G & R Drilling Co. 1-A Waggoner, 35-5-H&TC. Dry. TD 2,015 ft.

Young County: C. H. Brown Jr. 1 Sheppard, TE&L Sur. 1961, A-1035. Dry. TD 2,815 ft.

Hunter Bros. 1 Brooks, J. S. Shelton Sur., A-249. Dry. TD 2,741 ft.

Bill Lisle 1 Klenk, TE&L Sur. 174. Dry. TD 1,500 ft.

W. A. Lofton 1 King, Susan Sallie Sur. Dry. TD 555 ft.

WEST TEXAS

Borden County: Great Western Drilling Co. 1 Beal, 23-31-T3N-T&P. Dry. TD 7,995 ft. Elev. 2,459 ft., Mississippian reef 7,800 ft.

Great Western 1-A Beal, 22-31-T3N-T&P. Dry. TD 205 ft.

Cochran County: Gardner Bros. Drilling Co. 1 Faulkner, F-18, Lge. 137, Hemphill Sur. Dry. TD 4,812 ft.

Crockett County: Magnolia Petroleum Co. 1 Shannon-Hospital, 5-BB-EL&RR. Dry. TD 8,633 ft. Elev. 2,476 ft., Strawn 6,692 ft., Ellenburger 7,080 ft., Wilberns 8,573 ft., Cambrian 8,608 ft., pre-Cambrian 8,616 ft.

Dawson County: Cascade Petroleum 1 King, 105-34-T7N-D&SERR. Dry. TD 10,863 ft. Elev. 3,030 ft., Pennsylvanian 9,185 ft., Devonian 10,640 ft.

Texas Pacific Coal & Oil Co. 1 Dunlop, 46-35-T6N-T&P. Dry. TD 9,394 ft. Elev. 3,024 ft., Spraberry 7,346 ft., reef 9,302 ft.

WILDCAT COMPLETIONS

Hockley County: Great Western and Karl Hoblitzelle 1 Hinson, 4-17-Wichita CSL. Dry. TD 10,350 ft. Elev. 3,471 ft., Pennsylvanian 9,790 ft., Strawn 10,330 ft.

Howard County: Continental Oil Co. 1 McDowell, 3-34-T2S-T&P. Dry. TD 4,422 ft.

Oil Well Remedial Service 1 Fisher, 40-33-T1S-T&P. Dry. TD 3,512 ft.

Kimble County: Barron Kidd & Cherry Bros. 3 Johnson, GC&SF Sur. 9, A-1008. Dry. TD 1,148 ft.

Lubbock County: Texas Pacific Coal & Oil Co. 1 Austin, 41-A-HE&WT. Dry. TD 10,030 ft. Elev. 3,209 ft., Strawn 9,565 ft., Bend 9,900 ft.

Pecos County: Brown & Thorp Drilling Co. 1 Seale, 44-11-H&GN. Dry. TD 3,001 ft.

Reagan County: Cactus Drilling Co. 1 TXL, 235-1-T&P. Dry. TD 2,499 ft.

Runnels County: James K. Anderson 1 Routh, ETRR Sur. 175, A-171. Dry. TD 2,603 ft.

Gulf Oil Corp. 1 Puckett, 86-64-H&TC. Dry. TD 5,842 ft. Elev. 2,033 ft., Gardner sand 4,840 ft., Odom 5,006 ft., Cambrian 5,686 ft.

S. C. Herring Drilling Co. 1 Williams, Horton CSL Sur. 516. IP 156 BOPD, ¼-in., TP 350 psi., GOR 640 cu. ft., 40°, pay 3,720-26 ft. TD 4,213 ft.

Warren Petroleum Corp. 5 Smith, Sec. 79, HT&B Sur. IP 280 BOPD, 18/64-in., TP 440 psi., GOR 754 cu. ft., 40°, Goens lime 4,336 ft. TD 4,351 ft.

Sterling County: J. L. Damron 1 McEntire, 29-14-SPRR. Dry. TD 2,170 ft.

Tom Green County: C. B. Drilling et al 1 Stanford, Sec. 74, Dist. 11, SPRR. Dry. TD 7,152 ft. Elev. 1,877 ft., Strawn reef 5,238 ft., Ellenburger 5,963 ft.

LaGloria Corp. 1 Ford, Sec. 1626, H. Rako Sur. Dry. TD 4,930 ft. Elev. 1,755 ft., Ellenburger 4,785 ft.

H. Bryan Poff & Conkling Bros. 1 Davis, 137-11-SPRR. Dry. TD 4,875 ft. Elev. 1,928 ft., Strawn 4,500 ft.

SOUTHEAST NEW MEXICO

DeBaca County: Joe E. Morrison 1 Myrick, 17-2n-25e. Dry. TD 1,508 ft.

Lea County: Livermore Drilling Co. 1 Tyson Field, 35-12s-38e. Dry. TD 12,265 ft. Elev. 3,799 ft., Permo-Pennsylvanian 9,150 ft., Mississippian 11,480 ft., Devonian 12,245 ft.

NORTHERN NEW MEXICO

Rio Arriba County: Southern Union-Aztec Oil & Gas Co. 2-A Jicarilla, NE SW SW 14-26n-4w. IP 4,955 M.c.f. of gas per day. Pictured Cliffs discovery, new field. TD 3,619 ft.

ILLINOIS

Christian County: M. H. Richardson 1 Swope-Tomlin, 18-15n-2w. Dry. TD 1,900 ft.

O. A. Reed 1 Burdick, NE NE NW 18-13n-1e. Dry. TD 2,417 ft.

M. H. Richardson 1 Toothacre, NW NW NW 15-15n-1w. Dry. TD 1,892 ft.

Clay County: Noah Petroleum Co. 1 Brissenden, SW NW SE 31-3n-7e. Dry. TD 3,180 ft.

E. H. Kaufman 1 Stanford heirs, SW SE SE 26-3n-7e. Dry. TD 3,125 ft.

Cumberland County: Sutton & Chiodini 1 Lycam, SE SE SE 31-9n-11e. Dry. TD 665 ft.

Lawrence County: F. L. Beard 1 Pepple, NW NE NE 16-2n-12w. Dry. TD 1,398 ft.

St. Clair County: G. Mitchell 1 Schmidt, NE NE NE 24-1s-9w. Dry. TD 134 ft.

ONE GRAVELY TRACTOR
Powers 3 Mowing Tools!

Cut mowing costs—make only ONE investment in the power unit for ground maintenance tools. 5-HP Gravely gives you your choice—from 21 different tools—including three mowers!

REEL MOWER for fine lawns, quickly converted to 72" Gang Mower by attaching Gang Units. Add Sulky, cover more ground faster with less fatigue. ROTARY MOWER for lawn and weed cutting . . . with optional LEAF MULCHER assembly. SICKLE MOWER for tough weed and brush cutting jobs!

And remember, with Gravely, you have *twice* the power of the usual power mower!

PLUS 3 SNOW REMOVAL TOOLS

Snowblower, Snowplow, and Power Brush attachments make snow removal fast and easy . . . you change from job to job by removing and replacing only four bolts . . . suit the tool to the job or season in minutes!

PROOF...BY FREE DEMONSTRATION!

Yes, cut costs . . . and we will prove how you can . . . how you get more for your money when you get Gravely! A FREE demonstration is yours on request . . . *at no obligation.* Or write for "Power Vs. Drudgery" catalog, FREE!

GRAVELY TRACTORS, INC.
BOX 56 DUNBAR, W. VA.

VICTAULIC
METHOD OF PIPING

FOR GROOVED PIPE

Style 78
VICTAULIC SNAP-JOINT

New, boltless coupling — hand-locks — for faster hook-ups with no loose parts. Ideal for temporary or permanent lines. Sizes 1", 1¼", 2", 3", 4".

Style 77 & 77-D

VICTAULIC COUPLINGS Style 75

Style 77 & 77-D—The "general-purpose" couplings for standard applications. Simple, fast, reliable—sizes ¾" to 60".

Style 75—Light Weight Couplings—for low pressure, low external stress applications. Sizes 2", 3", 4".

VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle, operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

VICTAULIC FULL-FLOW FITTINGS

Streamlined for top efficiency, easy to install—complete line, Elbows, Tees, Reducers, Laterals, etc., — fit all Victaulic Couplings. Sizes ¾" to 12".

FOR PLAIN END PIPE

Style 99
VICTAULIC ROUST-A-BOUT COUPLINGS Best engineered, most useful plain end joint on the market! Simple, fast, husky. Easy to install with any socket wrench. Takes strong, positive, bull-dog grip on pipe. Sizes 2" to 8".

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog and Engineering Manual No. 54-8F.

VICTAULIC COMPANY OF AMERICA
P. O. Box 509 · Elizabeth, N. J.

EASIEST WAY TO MAKE ENDS MEET!

WILDCAT COMPLETIONS

INDIANA

Daviess County: M. Chapman 1 Hacker, SWc 5-2n-7w. Dry. TD 1,325 ft.

Dubois County: E. W. Pielemeier 1 Fuhrman, NW NE NE 5-1s-4w. Dry. TD 564 ft.

J. L. Knapp 2 Stefenagle, SW NW SW 19-1s-4w. Dry. TD 473 ft.

Knox County: D. L. Dieterle 2 U. S. Government, NW SW SW 22-1n-11w. Dry. TD 2,157 ft.

KENTUCKY

Crittenden County: Cruce & Craigheard 1 Cruce, NE SE SE 20-J-17. Dry. TD 1,030 ft.

Ryan Oil Co. 1 Truitt, S½ SW SE 1-L-18. Dry. TD 1,400 ft.

Daviess County: Stanley Lambert 2 Waitman, NW NE SE 6-P-29. Dry. TD 1,506 ft.

Ohio County: F. H. Rhodes 1 Ralph, SE NE NW 16-M-33. Dry. TD 672 ft.

MICHIGAN

Allegan County: James J. McGerry, Trustee 1 Schafer, SW SW NE 23-3n-13w. IPP 7 BOD. Traverse lime 1,749 ft., pay 1,749-52 ft., TD 1,752 ft. (New pool.)

Bay County: C. W. Collin 1 Moore, NE NW SE 31-18n-4e. IPP 5 BOD. Traverse lime 2,009 ft., pay 2,142-43 ft., TD 2,143 ft. (New pool.)

Van Buren County: Blunt Petroleum Co. 1 Shanahan, NE SE NE 24-4s-14w. IPP 10 BOD. Traverse lime 1,157 ft., pay 1,157-59 ft., TD 1,159 ft. (Extends Lawton pool.)

MISSISSIPPI

Jefferson County: Billups Brothers et al 1 Cato, C NW NW 26-9n-4e. Dry. TD 6,504 ft. Elevation 463 ft., Wilcox 4,035 ft.

Clyde E. Moss and Crow Well Service Co. 1 Noble, 36-10n-1w. IP 150 BOPD, 12/64-in., 31°, Wilcox-Stewart "A" sand 3,914-16 ft. (perforations). TD 6,034 ft. Elevation 249 ft., Wilcox 3,668 ft., base Baker shale 5,509 ft. (New field.)

SOUTH LOUISIANA

East Baton Rouge Parish: Atlantic Refining Co. 1 Edinborough Ogy, 53-7s-1e. IP 158 BOPD, ⅛-in., 40°, perforations 9,942-46 ft. TD 10,652 ft. (Extends Baton Rouge field.)

Evangeline Parish: Vincent & Welch, Inc., 1 Fruge, 40-6s-2w. Dry. TD 8,600 ft.

Jefferson Parish: William G. Helis estate 1 Canal Bank & Trust Co., 79-14s-23e. Dry. TD 10,500 ft.

Plaquemines Parish: California Co. 1 State Lease 1923, Township 23s-31e, South Pass Block 24 area. IP 268 BOPD, 9/64-in., 32.6°, perforations 8,671-80 ft. TD 9,771 ft. (New field.)

Kerr-McGee Oil Industries, Inc., 1-B State Lease 2327. Block 27, Breton Sound area. Dry. TD 6,300 ft.

Richardson & Bass 47-G Delacroix Corp., 14-16s-13e. Dry. TD 11,619 ft.

St. Landry Parish: Atlantic Refining Co. 1 Boagni, 22-6s-3e. Dry. TD 11,501 ft.

Pan American Production Co. 1 Burleigh, 25-7s-3e. IP 177 BOPD, 12/64-in., 39.2°, Tweedel sand perforations 10,944-50 ft. TD 11,100 ft. (New pay in West Shuteston field.)

Terrebonne Parish: Shell Oil Co. and Pan American Production Co. 1 South Coat, 29-18s-18e. Dry. TD 13,586 ft.

NORTH LOUISIANA

Bossier Parish: Jones Bros. Drilling Co., Inc. 1 Durbin, C SE SE NW 19-21n-13w. Dry.

WILDCAT COMPLETIONS

TD 2,450 ft. Outpost to Cottage Grove field.

Concordia Parish: Jett Drilling Co., Inc. 1 Harris, 8-6n-9e. Dry. TD 7,006 ft.

Jackson Parish: T. L. James & Co., Inc. et al 1 Machen, 36-15n-4w. Dry. TD 12,010 ft.

Webster Parish: Carter Oil Co. 3 Nora Davis, C NW NE NE 34-18n-8w. IP 4,100 M.c.f. and 4,250 M.c.f., "C" sand 9,930-54, 9,962-67 ft., Travis Peak 8,274-92 ft., ¼ in. and 14/64-in. TD 13,775 ft. (New pays—deeper Travis Peak and Cotton Valley deep test in Ada field.)

ARKANSAS

Cleburne County: Western Natural Gas Co. 1 Lucy Chapman, C NW NE NW 14-9n-12w. Dry. TD 4,919 ft. St. Peters sand 4,844 ft.

Miller County: Kern-Trimble Drilling Co. 1 Crank, C SW S WSW 24-16s-26w. Dry. TD 4,511 ft.

OKLAHOMA

Comanche County: Wm. H. Atkinson 1 Ambrose, SW NW NW 11-2n-10w. Dry. TD 2,481 ft.

Sunray Oil Corp. 1 Bentley, C NW SE 22-3n-10w. Dry. TD 8,653 ft.

Garfield County: Van Grisso Oil Co. et al 1 LeGrant, SW SW NE 34-21n-3w. Dry. TD 4,816 ft.

Garvin County: Sun Oil Co. 1 Garland, NW NW SW 25-3n-1w. Dry. TD 4,280 ft.

Paul C. Tees 1 Smith, NE SE NW 16-4n-2e. Dry. TD 3,602 ft.

O. V. York 1 Conley, NE NE SW 22-4n-3e. Dry. TD 3,769 ft.

Harmon County: D. H. Bolin et al 1 Cummins, C NW SW 23-2n-26w. Dry. TD 7,216 ft.

Hughes County: Seaboard Oil Co. of Delaware 1 Gamble estate, NW NW SW 18-6n-9e. Dry. TD 5,862 ft.

Kay County: O. H. Parker 1 Mark, NE NE SE 25-28n-2w. Dry. TD 4,563 ft.

Glenn A. Campbell et al 1 DeSmith & Power, SW NW NE 1-15n-4e. Dry. TD 3,902 ft.

Davidor & Davidor 1 Wakley, SE SE NE 27-15n-3e. Dry. TD 4,441 ft.

Lincoln County: Macmillan Petroleum Corp. 1 Precure, NW SW SW 11-12n-13e. Dry. TD 5,564 ft.

Jones-Shelburne 1 Tomanec, NE NE NE 33-12n-5e. Dry. TD 4,913 ft.

Joe Bradley et al 1 Blum, NE NE SE 36-14n-2e. Dry. TD 4,690 ft.

McCurtain County: Robin H. Brians 1 Smith, NW NW NW NW 17-8s-23e. Dry. TD 1,469 ft.

Okfuskee County: Cyclone Drilling Co. 1 Shealey, NE NE SW 9-12n-8e. IPP 50 BOPD, UV-Cromwell 3,714-20½ ft., 40°. TD 3,720 ft. (Oil discovery.)

Osage County: O. A. Shaw 1 Osage, SW NE SE 30-26n-6e. IPF 250 BOPD, Burbank 2,930-49 ft., 39°, ½-in. TD 2,949 ft. (Oil discovery.)

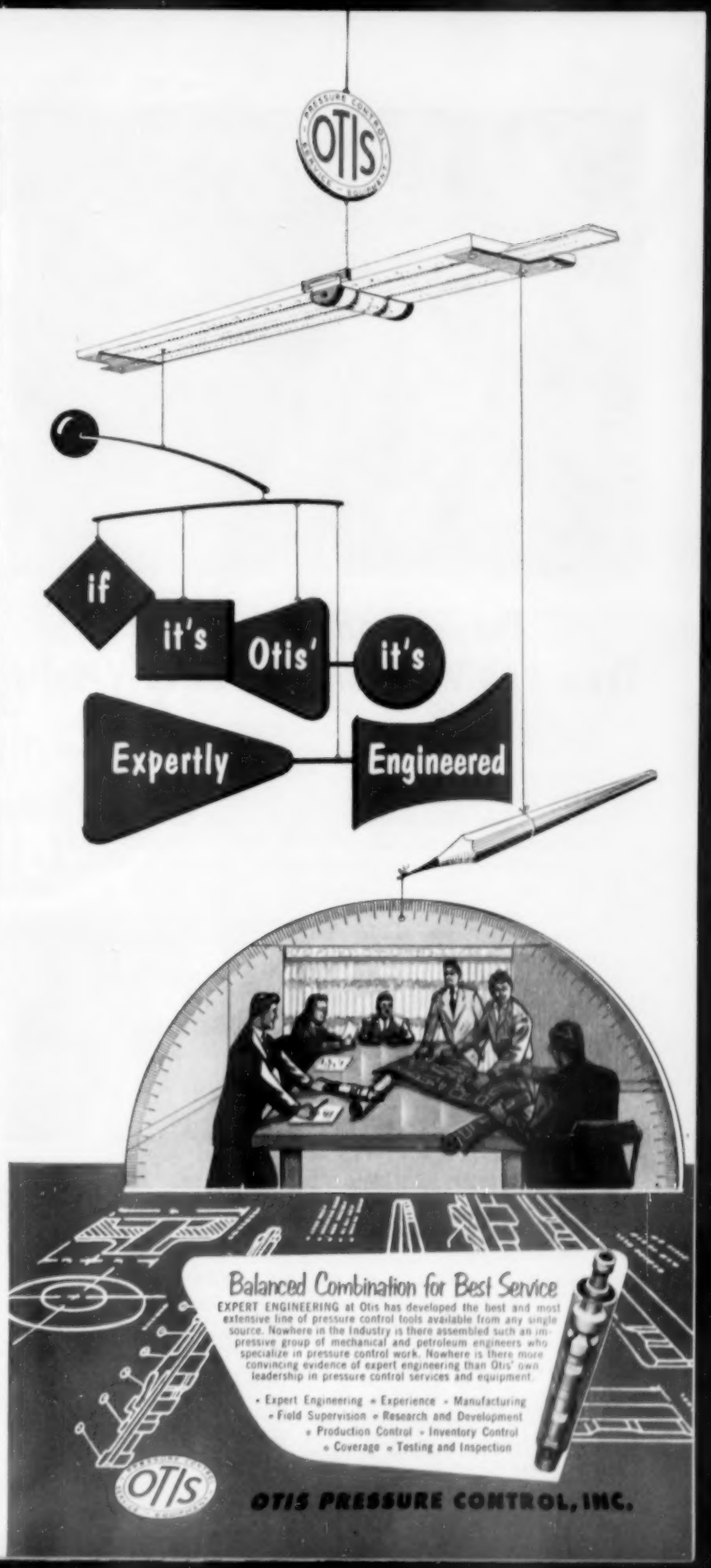
Pawnee County: Gulf Coast Western Oil Co. 1 Griesel, SW NE SW 3-21n-5e. Dry. TD 3,176 ft.

KANSAS

Barber County: Barbara Oil Co. 1 Forester, SW NE NE 28-33s-11w. IPF 12 BOPD, Miss. 4,486-97 ft. TD 5,028 ft. (Opens Roundup pool.)

Graham County: Trans-Era 1 Morris "B," SW SW SW 26-7s-23w. Dry. TD 4,023 ft.

Harper County: Carter Oil Co. 1 Antrim, NW NW NE 25-31s-9w. IPF 298 BOPD, Miss. 4,397-4,403 ft. TD 4,951 ft. (Opens Grabs South pool.)


OTIS
if
it's
Otis'
it's
Expertly
Engineered
Balanced Combination for Best Service
EXPERT ENGINEERING at Otis has developed the best and most extensive line of pressure control tools available from any single source. Nowhere in the industry is there assembled such an impressive group of mechanical and petroleum engineers who specialize in pressure control work. Nowhere is there more convincing evidence of expert engineering than Otis' own leadership in pressure control services and equipment.
• Expert Engineering • Experience • Manufacturing
• Field Supervision • Research and Development
• Production Control • Inventory Control
• Coverage • Testing and Inspection
OTIS
OTIS PRESSURE CONTROL, INC.

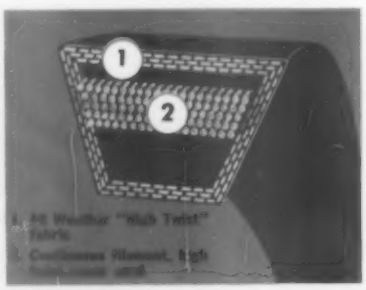
Put 'em on and Forget
These "All Weather" Thorobred V-Belts

For drives like these, or for pumping units, or any field drive, Dayton Thorobred V-Belts give year in, year out dependable performance with virtually no inspection.

The Thorobred V-Belt is ideal for field use. Its rugged cover is made of rubber filled *all weather* "High Twist" Fabric—its sturdy cords are made of a continuous filament, high twist rayon—not cut filaments! Reasons why you get maximum V-Belt life from Dayton Thorobreds.

Make use of Dayton's Field Engineering assistance and get 'round-the-clock service from Dayton's conveniently located field warehouse stocks.

Contact your nearest Dayton Distributor (see listing below) or write direct for complete details to: Dayton Rubber Company, Industrial Division, Dept. 705, Dayton 1, Ohio.



For Every Oil Field Power Plant Need

Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

These Dayton Oil Field Distributors are as near as your telephone:

LOUISIANA

Shreveport: Bearing & Transmission Co.
Oil City: Oil City Hdwe. and Supply Co.
New Orleans: Edgar Murray Supply Co.
Lake Charles: Behring's Bearings, Inc.

TEXAS

Corpus Christi: Bradley Motor & Armature Works
San Antonio: Alamo Iron Works
McAllen: A. M. Hassel Co.
Houston: Behring's Bearings, Inc.
Wichita Falls: Savage Electric Co.
Pampa: Radcliff Supply Co.
Odessa: Duke Electric Co.
Dallas: Bearing Chain & Supply Co.
Abilene: Carpenter V-Belt Co.
Borger: Radcliff Supply Co.
Orange: Sabine Supply Co.
Marshall: Power Supply Co.
Beaumont: Behring's Bearings, Inc.
Lubbock: Lubbock Electric Co.
Waco: Ford Hanna Co.

OKLAHOMA

Oklahoma City: Republic Supply Co.
C. F. Dagwell & Co.
Tulsa: Machine Tool & Supply Co.
Haroldton: Lewis Magneto & Ignition Co.

WILDCAT COMPLETIONS

Harvey County: Penquin Petroleum Co. et al 1 Shive, SW SE NE 26-22s-3w. Dry. TD 3,278 ft.

Hodgeman County: B&R 1 Williams, SW SW NW 28-23s-25w. Dry. TD 4,930 ft.

Kingman County: Pickrell Drilling Co. 1 Stevenson, NW NW NW 12-30s-6w. Dry. TD 4,648 ft.

Marion County: Perkins et al 1 Martin, SW SW NE 1-17s-4e. IPP 35 BOPD, Miss. chat 2,310-23 ft. TD 2,348 ft. (Oil discovery.)

Norton County: Jones, Shelburne & Farmer 1 Sanderson "B," NW NW NW 18-2s-23w. Dry. TD 3,750 ft.

Pawnee County: Amerada Petroleum Corp. 1 Minor, SW SE SE 25-21s-17w. Dry. TD 4,342 ft.

Pratt County: Appleman-Trans-Era 1 Martin, SW SW NW 36-26s-11w. Dry. TD 4,518 ft.

Rooks County: Jones, Shelburne & Farmer 1 Atteberry, SE SE NW 22-6s-20w. Dry. TD 3,772 ft.

Shawnee County: Musgrove et al 1 Heiland, NW NW NW 6-10s-13e. Dry. TD 3,329 ft. Pre-Cambrian 3,320 ft.

Sumner County: K. T. Wiedemann 1 Paxton, NW NW NW 35-30s-1e. Dry. TD 3,726 ft.

Trego County: Walters Drilling Co. 1 Walker, SW SW SW 6-11s-23w. Dry. TD 4,395 ft.

NEBRASKA

Kimball County: Sure Oil Co. 1 Spencer, SW SW NW 10-15n-54w. Dry. TD 5,995 ft.

Cheyenne County: O'Donnell & Edmundson 1 Frerichs, SW SW SW 15-15n-48w. Dry. TD 4,736 ft.

H. E. Zoller 1 Christianson, C SW SE 21-14n-52w. Dry. TD 5,505 ft.

Kimball County: Superior Oil Co. 47-30 Christensen, NE SE SW 30-13n-54w. Dry. TD 6,282 ft.

Scottsbluff County: S. T. Kiespert and T. O. Matkins, SE SE SW 35-23n-54w. Dry. TD 4,863 ft.

NORTH DAKOTA

Rollete County: Cardinal Drilling Co. 1 Lamont, SW NW 27-161n-73w. Dry. TD 3,044 ft. in Lodgepole.

CALIFORNIA

Kern County: T & T Oil Co. 2 Klipstein, 7-10n-23w. Dry. TD 2,200 ft.

Standard Oil Co. of California 4 Jeppi, 17-30s-29e. Dry. TD 6,300 ft.

Monterey County: Contra Flush Drilling Co. 3 Biaggio, 12-22s-9e. Dry. TD 1,505 ft.

Orange County: Murphy Bros., Ltd., and A. D. Rushing, Inc. 1 Brown-Hendrickson, 11-6s-11w. Dry. TD 5,039 ft.

San Benito County: Standard Oil Co. of California 27-35 Eade, 35-18s-9e. Dry. TD 2,956 ft.

Ventura County: Richfield Oil Corp. 1 Janss, 36-2n-20w. Dry. TD 8,151 ft.

MONTANA

Dawson County, Glendive area: Farmers Union 1 Hathaway, NE SE NE 6-14n-55e. Dry. TD 6,315 ft. in Heath.

Musselshell County, East Melstone: Farmers Union 1 Bloom, SE NE NW 22-10n-30e. Dry. TD 5,632 ft.

WYOMING

Niobrara County: Great Basins Petroleum Co. 43-11 Government, SE NE SE 11-38n-65w. IPP 32 BOPD, Newcastle sand discovery, new field. TD 7,200 ft.

Your drilling operation continually benefits because . . .

Baroid's unequalled distribution offers you:

- 170-plus distributors . . .
- 600-plus warehouse stocks . . .
- A multi-million-dollar inventory of field-proved mud products . . .
- 5000-plus experienced distributors' men . . .

Why? To Satisfy Your Drilling Mud Requirements. WHEREVER THE WELL . . . WHATEVER THE TIME . . . Baroid, the first and leading producer of mud materials, recognizes a responsibility to the industry by providing unequalled distribution of quality products.

you can rely on your

Baroid

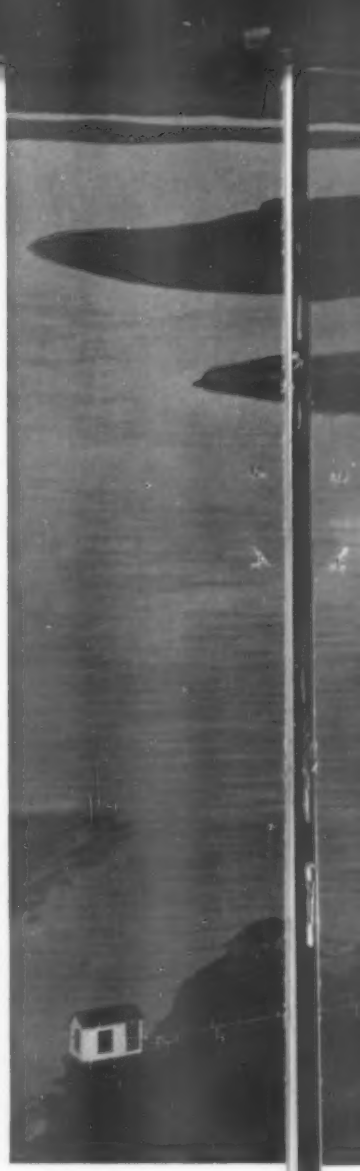
DISTRIBUTOR

BAROID SALES DIVISION • NATIONAL LEAD COMPANY • MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

Your drilling operation continually benefits from BAROID'S unequalled mud experience . . . .

Baroid's unequalled twenty-five years of practical and technical experience is continually at your disposal for assistance in maintaining successful and economical mud programs, and assisting in quick solutions to your special mud problems.

Use Baroid products and services . . . the accepted standard of the industry . . . for better mud, greater drilling safety, and lower drilling cost.



BAROID · AQUAGEL · DRILLING MUD PRODUCTS · DISTRIBUTOR

you can rely on

BAROID SALES DIVISION • NATIONAL LEAD COMPANY • MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

Highest quality mud products, in ample supply, are assured by Baroid's unequalled production facilities.

Constantly improving drilling mud control for faster, safer, deeper drilling results from Baroid's unequalled laboratory and field experience.

Baroid

HOUSTON · TULSA · LOS ANGELES

Flying engineer service and "Bulkan" bulk Baroid delivery assure the best service possible to every land and water location. These are continuing reasons why "Baroid" is synonymous with better mud.

Skilled service engineers provide safe, economical mud control, backed by Baroid's unequalled practical and technical experience.

Highest quality mud products for solving every drilling mud problem are quickly available, in every active area, from Baroid's unequalled distribution.

Almost gone...but not forgotten!

The ravages of blowouts are almost gone from today's drilling, due to modern mud control and mechanical equipment.

During these progressive years, oil operators have continually relied on Baroid to maintain the proper mud weight needed to control formation pressures.

Baroid has proved to be the outstanding weight material because of continued high quality, high specific gravity, good suspending properties and freedom from corrosiveness and abrasiveness.

As fine a weight material as research has produced and money can buy, Baroid is the most extensively used weight material in the industry. For over a quarter-century, Baroid's top quality has been maintained by unvarying process standards, to supply a product providing maximum weight increase with minimum resulting viscosity increase to the drilling fluid.

Over 600 distribution points, strategically located for on-the-rig delivery service to every active drilling area, can supply you with Baroid in any quantity desired. Bulk Baroid available to Gulf Coast rig locations.

NOW AS EVER

you can rely on

Baroid

BAROID SALES DIVISION • NATIONAL LEAD COMPANY
Main Office: P. O. Box 1675, Houston 1, Texas

BAROID — most used drilling weight material

BAROID SALES DIVISION • NATIONAL LEAD COMPANY
P. O. Box 1675, Houston 1, Texas

Please send me a copy of the new Drilling Mud on BAROID properties and applications.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

WILDCAT COMPLETIONS

Buck Creek Oil Co. 1 Government, SE NE SW 2-35n-64w. Swabbed 360 BOPD, Dakota discovery, new field. TD 4,058 ft.

Weston County: H. N. & L. Syndicate 1 Flores, SW SW NW 2-42n-65w. Dry. TD 6,350 ft. in Newcastle. Shut down.

COLORADO

Logan County: Jack Ladmer 1 Spear, SE SE SW 6-5n-54w. Dry. TD 5,041 ft.

Lee Swedlund 1 Binaco, SE SW SW 31-9n-52w. Dry. TD 4,918 ft.

Vaughey & Vaughey 1 Byrd, C SW SW 31-9n-54w. Dry. TD 5,447 ft.

Morgan County: Denver Basin 1 Johnson et al, NE NE SW 13-1n-56w. Dry. TD 5,114 ft.

National Associated ePtroleum Co. 1 Beery, NW NW NE 21-6n-55w. Dry. TD 5,536 ft.

Petroleum, Inc. 1 Morgan Co. Investment Co. "A," NE NE SW 31-3n-57w. Dry. TD 5,775 ft.

BRITISH COLUMBIA

Fargo Oils 1 Nig Creek, Unsurveyed. Suspended. TD 4,829 ft.

SASKATCHEWAN

Imperial 7-1 Coleville, LSD 7, 1-32-23w3. Viking gas well. TD 2,308 ft.

Imperial 7-9 Coleville, LSD 7, 9-32-23w3. Dry. TD 2,470 ft.

Imperial 7-1-31-22 Hopedale, LSD 7, 1-31-22w3. Dry. TD 2,261 ft.

Socony-Sohio 18-3 North Ormiston, LSD 3, 18-10-25w2. Dry. TD 6,012 ft.

Socony-Central-Del Rio 22-13 West Ratcliffe, LSD 13, 22-1-16w2. Dry. TD 6,640 ft.

Rio-Prado 9-26 Scepture, LSD 9, 26-22-24w3. Dry. TD 3,443 ft.

ALBERTA

Richfield Oil Corp.-Sinclair-Sun 13-27 Cheadle "A," LSD 13, 27-24-26w4. Dry. TD 7,909 ft.

Fina-Cities Service 6-7 Greencourt, LSD 6, 7-58-9w5. Mississippian oil well. TD 8,075 ft. PBTD 5,210 ft.

Hudson's Bay 1 South New Norway, LSD 3, 2-45-21w4. Dry. TD 5,620 ft.

NORTHWEST TERRITORIES

N.W.T. 1 Escarpment Lake, 60° 35' 43". N. Lat., 116° 13' W. Longitude. Suspended. TD 2,089 ft.

International

(Continued from page 138)

including more drill pipe, is being brought in for further tests.

General superintendent of field operations for Sinclair in Ethiopia is William Clift. David C. Norris is drilling superintendent. Both were formerly with Sinclair in Venezuela. The Sinclair concession in Ethiopia was obtained in 1945. Originally the entire country was covered but, as provided under concession terms, 50 per cent was relinquished.

Across the border to the south and east in Somalia, or what was formerly Italian Somaliland, Sinclair is about to begin seismograph work to detail selected parts of the 97,000-sq.-mile concession which it holds in that country. Gravity and ground magnetometer surveys have been carried out over the last year. Sinclair owns half of the operation company, Sinclair Somal, with the remaining half divided equally among Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp.

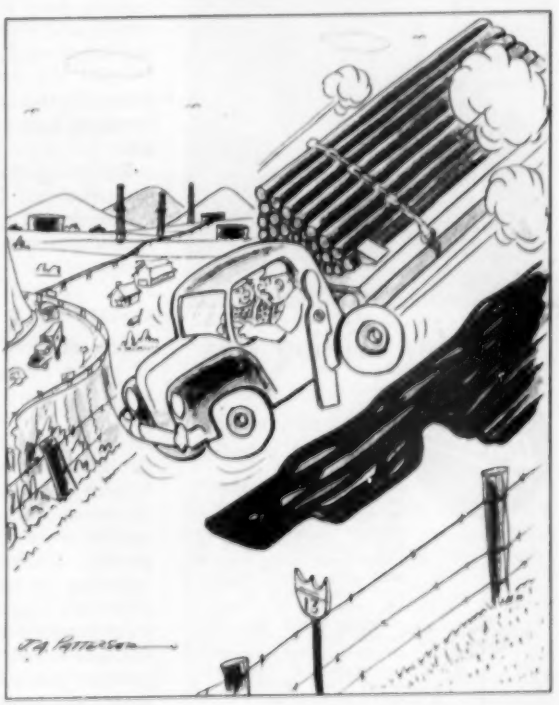
Aramco Ups Pipeline Capacity

Arabian American Oil Co. has installed additional pumps at its Qatif Junction in order to maintain Trans-Arabian Pipe Line deliveries and at the same time increase the amount of crude bled off to Ras Tanura for offshore shipment.

An upward surge in requirements of Aramco's owning companies raised the company's crude production target for the first quarter of this year to between 930,000 and 940,000 bbl. daily. This compares with an 845,000-bbl. daily average in 1953. The demands on Aramco's oil-handling system have forced maximum operation of these facilities.

Because of the urgent need for the additional equipment at Qatif, the en-

HIGHER RECOVERY
FASTER CORING TIME
FEWER TRIPS
DRILLING & SERVICE
DIAMOND WIRE LINE
CORE BARRELS
Now available in four sizes: 4¼" OD, 4½" OD, 5¾" OD, and 6⅞" OD to cut hole from 4½" diameter up.
Whether in slim-hole or conventional drilling, D & S Diamond Equipment for wire line coring will merit consideration.
TRUCO DIAMOND BITS
D & S CORE BARRELS
DRILLING & SERVICE
3031 Elm Street
Dallas 1, Texas



THE OIL AND GAS JOURNAL

"Whatta you mean you saved us a lotta dough by fixin' the brakes yourself."

INSURE AGAINST CORROSION!

PREVENT COSTLY DAMAGE!
CHECK EXISTING RUST!

You'll find VEGO CHEMICAL BLACK is your best insurance against the damaging, costly effects of corrosion—not only for sealing steel and other metals against rust, but also for penetrating existing rust down to the metal and sealing it against further corrosive action! It is also excellent for waterproofing. Easy to apply, VEGO CHEMICAL BLACK forms a continuous protective bond that expands and contracts with surfaces to which it is applied.

- Easy to apply—spray, brush or dip.
- Available in 55, 30 and 5 gal. drums; 1 gal. cans, four to a carton.
- Needs no stirring—stays in constant suspension. Will not skin.

CHEMICALS & MATERIALS CORP., TERRE HAUTE, IND.

VEGO CHEMICAL BLACK
PRODUCTS OF QUALITY FOR INDUSTRY

ideal for drilling rigs

Woods

oil, heat, water resistant v-belts

If your V-Belts are affected by static, oil, heat, or water we suggest you consult us. We won't offer any "cure-all" belts for these conditions, but we will offer belts designed and constructed to resist oil, heat, etc to a varying degree. You'll get much longer belt life and have fewer expensive belt replacements. So before you order that next set of belts, consult us.

T. B. WOOD'S SONS COMPANY
1117 W. COMMERCE ST., DALLAS, TEXAS

tire pump assemblies, weighing more than 35 tons, were airshipped to Dhahan from the United States. The movement was on four KLM aircraft, the first, a cargo carrier, transporting a pump, engine, and radiator weighing 22,040 lb.

The full installation consisted of two complete diesel-driven pumping units rated at 375 hp. each. They will allow increasing pressure on this segment of the system by an additional 100 psi.

At the Qatif Junction, the main 30-31-in. line from Abqaiq continues on north to Tapline while other lines lead east to the Ras Tanura refinery and the shipping terminal. Aramco has four outlets for its production, Tapline taking about 305,000 bbl. daily, Bahrain, about 180,000 bbl. daily and the Ras Tanura refinery, about 240,000 bbl. daily. The remainder is lifted by tankers at Ras Tanura.

The company is continuing work on the construction of a new 20 and 22-in. line from Qatif to Ras Tanura to move additional oil for offshore shipment.

Italy Seeks Market

Domestic refining capacity leaves exportable surplus

EVEN with continued growth in consumption and no further refinery expansion, Italy will have an exportable surplus of domestically refined products totalling some 7,000,000 tons, or about 140,000 bbl. daily, in 1957, Dr. Vincenzo Cazzaniga, president of Esso Standard Italiana, said recently in Milan.

Reviewing the economics of the Italian petroleum industry at the Milan Politecnico, Dr. Cazzaniga estimated Italian consumption of products in 1957 at approximately 8,500,000 tons, or about 170,000 bbl. daily, in 1957, against 136,000 bbl. daily last year.

Export markets . . . The development of export markets to absorb potential surplus refinery production during the next few years was listed by Dr. Cazzaniga as one of the main problems of the Italian industry. He said Italian refineries also face the necessity of making investments to improve further the quality of their production, especially gasoline. Studies should be undertaken regarding the balance to be established both from a quality and quantity standpoint between Italian refinery production and domestic consumption. Higher gasoline production and lower fuel oil output would improve prospects in domestic consumption and in export markets.

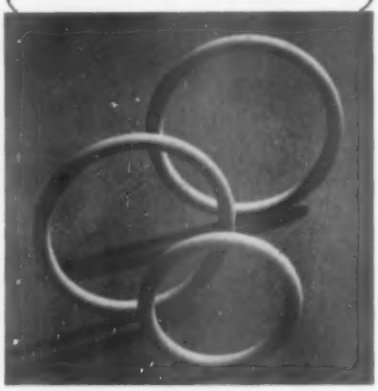
Currency requirements for the purchase of crude oil in Italy were estimated at the equivalent of $88,000,000, of which 60 per cent is from the dollar area and 40 per cent from European Payments Union countries. Against this, Dr. Cazzaniga said, are the large receipts from the exports of products and the investments of foreign oil companies in Italy. He calculated these investments to amount to the equivalent of $193,000.000.

International Briefs

Cia. Idrocarburi della Scilia D'Arcy has been incorporated at Palermo, Sicily. Capital to the new company has been subscribed by the D'Arcy Exploration Co., Ltd., exploration affiliate of Anglo-Iranian Oil Co., Ltd., and by Anglo-Iranian. D'Arcy is one of several foreign companies carrying on exploratory operations in Sicily.

The world-wide Royal Dutch-Shell organization last year placed export orders in Britain amounting to the equivalent of $81,200,000. According to a company statement in London, more than 3,500 British plants and factories contributed to the total. The largest export deliveries for Shell were made to producing countries, such as Venezuela and British Borneo, but special equipment was sent to Australia and India for new refining projects.

TEFLON "O" RINGS molded by DORE' for Oil Industry Applications



• Molded by Dore', TEFLON* "O" Rings are available in a wide range of sizes; are made to A-N specifications and tolerances. They can be installed in all standard "O" ring grooves. Working temperatures range from —90° F. to 350° F.

*TEFLON is E. I. du Pont's registered trademark for Tetrafluoroethylene resin.

John L. Dore, Co.
SALES AGENTS IN U.S.A. FOR JOHN L. DORE' INC.
MOLDERS OF TEFLON SHAPES
P. O. BOX 7772 • HOUSTON 7, TEXAS

A.P.I. Honors Pew

Refining Division praises Sun director's service

ARTHUR E. PEW, JR., who guided the refining fortunes of the Sun Oil Co. for 17 years, recently received public recognition for his services to the oil industry as a whole.

The Division of Refining of the American Petroleum Institute recognized Pew's 15 years of service on its refinery equipment committee by presenting him with a certificate which read in part:

"An able engineer and technologist; a dynamic and enthusiastic administrator and promoter of the advancing technology of petroleum refining, he has given generously of his time and talent over the years to the work of the division of refining, contributing importantly to the projects of several of its major committees."

Pew was born in Mercer, Pa., in 1899 and was educated at Hill School, Pottstown, Pa., the U. S. Naval Academy, and the Massachusetts Institute of Technology.

After being graduated from M.I.T. he joined Sun in the production department in 1922, but later the same year transferred to the Marcus Hook, Pa., refinery. Pew began as a stillman and also worked in the maintenance section before being appointed chief engineer of the refining department in 1926.

In 1927 he was named to the board of directors and in 1930 he was appointed vice president in charge of manufacturing, a post he held until 1947.

Pew's grasp of the technical end of the refining industry enabled him to assist Eugene Houdry in developing catalytic cracking in 1934 when Houdry came to the United States from France with an idea for the catalytic refining of gasoline. Pew and others worked with Houdry until the idea became practical.

During World War II, Pew served as vice chairman of the District 1 committee on refining under the Petroleum Administration for War; and was a member of the advisory committee on aviation gasoline which also was under PAW.

Pew still serves as a director of Sun and also chairman of the board of Universal Mould Products Corp., of Philadelphia.

In addition to his many jobs, he has found time for relaxation and is a member of four Philadelphia clubs, the Merion Cricket Club of Merion, Pa., and the Corinthian Yacht Club of Essington, Pa.

John H. Garner, formerly assistant production manager for Drilling & Exploration Co., Inc., has become a consulting engineer at Houston.

Paul K. Lewis, assistant superintendent for Douglas Oil Co., has been transferred from Santa Maria, Calif., to Paramont, Calif.

Earl M. Kieke has been promoted by Stanolind Oil & Gas Co. from petroleum engineer at Houston to field engineer at Beaumont, Tex.

W. E. Reed, drilling superintendent for Stovall Drilling Co., has been transferred from Monroe, La., to Texhoma, Okla.

William P. Binger, mechanical engineer for Shell Oil Co., has been transferred from Tulsa to Wichita, Kans.

Wayne Rogers has been promoted by British-American Oil Producing Co. from petroleum engineer at Dallas to central district engineer at Oklahoma City. He replaces **Gordon J. Buckle,** who has been made district superintendent at Houston.

A. Knox Tyson, Houston, has become a managing partner in Slick-Moorman Oil Co. of San Antonio and Houston. Tyson recently resigned as president and director of American Republics Corp. of Houston and was associated with Continental Oil Co. from 1929 until 1948.

Arthur J. Dickenson, geologist, formerly with Shell Oil Co., has joined Lion Oil Co.

Ted G. Ward, Jr., has joined Buckles & Hostler, oil production consultants, in Monahans, Tex., as chief engineer. For the past several years he has been specializing in water flooding in West Texas.

Henry S. Yeager, Mayport, Pa., has been appointed assistant superintendent of Peoples Natural Gas Co.'s Clarion section of Armstrong field district. He formerly was district clerk.

A. A. (Al) Dill, manager of the New York Division of Axelson Manufacturing Co., Division of Pressed Steel Car

A. A. DILL

R. V. McINTIRE

Co., Inc., has been elected chairman of Nomads national board of regents. **Russ V. McIntire,** New York export manager for Baker Oil Tools, Inc., was chosen secretary-treasurer.

J. J. Lawnick has resigned as an exploitation engineer in Shell Oil Co.'s Corpus Christi division to join La Gloria Corp. as a petroleum engineer in the drilling and production department in Corpus Christi.

Gervais F. Favrot, New Orleans, has been appointed to the board of directors of United Gas Corp., replacing **Clifton L. Ganus,** who resigned because of his health after being a director for about 4½ years.

James F. Templeton has been advanced by Stanolind Oil & Gas Co. from engineer trainee at Shawnee, Okla., to junior petroleum engineer at Vivian, La.

George S. Moore and **George L. Robinson** have been elected to the board of directors of Buckeye Pipe Line Co., replacing **Paul R. Applegate** and **John H. Peper,** each formerly president and chairman of the board. Moore is an executive vice president of National City Bank of New York

PERSONALS

and Robinson is a vice president of Buckeye in charge of its eastern products division.

James W. Carneal has been appointed assistant superintendent of the pipeline department of Texas Gas Transmission Corp., Houston. He formerly was assistant to the pipeline department superintendent.

Ed Collins has joined Vickers Petroleum Co., Inc., as a petroleum engineer at Wichita. He formerly was division engineer at Midland, Tex., for Wilshire Oil Co., Inc.

J. Randolph Buck, with DeGolyer & MacNaughton since 1951 as a reservoir engineer, has resigned to become a consulting engineer. His offices are in Dallas.

H. H. West has been elected a vice president of Ohio Oil Co. He joined Ohio in 1922, became secretary in 1951, and was elected to the board of directors in 1953.

R. D. Blubaugh has been named chief engineer at Pure Transportation Co.'s main Michigan pumping station near Midland, replacing **B. C. Weller,** who has retired after 41 years with the company. Blubaugh had been a pipeline delivery gager at Pure Oil Co.'s refinery at Midland.

E. F. Allen has been elected a director of Toklan Royalty Corp. He also is executive vice president and director of the First National Bank & Trust Co., Tulsa.

John H. Moore has been promoted by The Texas Co. from Oklahoma district engineer in Tulsa to assistant Rocky Mountain division engineer in Denver.

W. D. Sutherland, former senior petroleum engineer with J. S. Abercrombie Co., has resigned to become chief engineer for Drilling & Exploration Co., Inc.

Charles W. West has been named a general partner and vice president of Frank Murphy & Associates, a subsidiary of Chieftain Oil Co. West is an independent oil operator with holdings in the Timber Canyon area near Santa Paula, Calif. **Edward Maloof** has been elected executive vice president and special assistant to **Napoleon Shalhoob, Jr.,** president of Chieftain Oil Co.

R. Manville Touring, geologist for Humble Oil & Refining Co., has been transferred from Los Angeles to Eugene, Ore.

C. C. Wuth has been appointed chief engineer at Shell Oil Co.'s Wood River refinery. Wuth joined Shell in 1929 at the Martinez refinery and in 1946 moved to the San Francisco office as senior engineer.

J. D. Ramsey, formerly senior engineer at Shell Oil Co. Norco, La., refinery, has been named manager of the refinery's newly established utilities department. Ramsey joined Shell at the Wood River refinery as an electrical engineer in 1947 and was transferred to Norco in 1952.

Bryant F. Kenney, chairman and managing director of Standard-Vacuum Refining Co. of South Africa (Pty.), Ltd., has been elected to the board of directors of the parent company, Standard-Vacuum Oil Co., in New York. **Joseph B. Nolan** of Capetown, South Africa, was named shareholders' representative in the union and in this capacity will be chairman of Stanvac's marketing subsidiary and also of the refining company. **Charles E. Solomon,** also of South Africa, was named managing director of the marketing company.

William D. Shaw, Culver City, Calif., has been elected to the board of directors of Keck Oil Co., Inc.

J. F. Dougherty has been admitted to general partnership in Lambert Oil Exploration Co. He recently resigned as vice president of the Empire Trust Co. and prior to that was a vice president of DeGolyer & MacNaughton, Dallas.

W. D. Lane has resigned as district superintendent of Plymouth Oil Co. in the West Texas-New Mexico area to become an independent operator with headquarters in Midland. Lane had served the last 8 of his 29 years with Plymouth as district superintendent at Midland. Lane is president of the Permian Basin Oil Show and a past chairman of the Permian basin chapter of the American Petroleum Institute.

Newly Elected West Coast A.P.I. Officials

These officers were elected recently at the Pacific Coast District, Division of Production, American Petroleum Institute meeting at Los Angeles. Left to right (standing) John Van Riper of Continental Oil Co., vice chairman for coastal area; Lot Bowen of Western Gulf Oil Co., chairman of advisory committee; L. B. Doyle of Hydril Corp., assistant treasurer. (Seated) Elsie Edmiston of the A.P.I., secretary; C. F. Gates of General Petroleum Corp., chairman of Pacific Coast district; Hugh C. Mays of Crescent Petroleum Co., vice chairman for San Joaquin Valley. Not shown: E. M. Benson, Jr., of Richfield Oil Corp., vice chairman for Los Angeles Basin; Jack Lemley of Standard Oil Co. of California, vice chairman for Coalinga-Kettleman area; and Charles T. Reichert of National Supply Co., treasurer.

PERSONALS

Co-inventor of Butyl Synthetic Rubber Honored

Dr. William J. Sparks, right, co-inventor of butyl synthetic rubber, has been awarded the 1954 Gold Medal of the American Institute of Chemists for his efforts in the promotion of chemistry and the professional advancement of chemists. Dr. Gustav Egloff, left, chairman of the institute's medal award committee, made the presentation. Sparks is director of Standard Oil Development Co.'s chemical division and is coordinator of exploratory research.

Roy B. Dannenberg, geologist with The California Co. at Mattoon, Ill., has resigned to do consulting work.

Marc O. Miller, geophysicist with Continental Oil Co., has been appointed geophysical supervisor at Los Angeles.

J. J. Plombon, Shell Oil Co. engineer, has been moved from Corpus Christi to Kilgore.

Marcus A. Loy, Jr., former petroleum engineer with British American Oil Co., at Houston, has joined Service Corp. as sales engineer at Long Beach.

Verner A. Gillis has resigned as consulting geologist for Northern Pacific Railway Co. to open general geological offices in Billings. Gillis had been with Northern Pacific since 1921. **Robert L. Sprinkle,** chief petroleum geologist for Northern Pacific, also resigned to join Seaboard Oil Co. as district exploration manager in Billings.

Barney Oldham, R. L. Manning Drilling Co., has been elected president of the board of directors of the Casper Petroleum Club. Other officers are: **A. P. Lacey,** Continental Supply Co., first vice president; **T. G. Costakis,** Stanolind Oil & Gas Co., second vice president; and **A. W. Craig,** consultant, secretary-treasurer.

William M. Martin and **Harold L. Crisman** have been named vice presidents of Russell Cobb, Jr., Inc., Tulsa oil-producing firm.

W. C. Hamilton, Jr., who organized the geology department at Midwestern University in Wichita Falls, Tex., in 1948, has resigned to enter private business in Wichita Falls.

R. R. Lamb, geologist for Atlantic Refining Co., has been transferred from Bismarck, N. D., to Lake Charles, La. **Clyde M. Rascoe** has moved from Midland, Tex., to replace Lamb.

O. M. Framsom, geologist with The Texas Co., has been transferred from Lewiston, N. D., to Bismarck, and **Robert Wakefield** has been moved from Bismarck to Denver.

L. V. Steck, vice president in charge of marketing for Shell Chemical Corp., has been awarded the Commercial Chemical Development Association medal for 1954. The award is made annually by the association for outstanding accomplishments in the field of commercial chemical development. Steck, a graduate of the University of California, joined Shell Development Co. 24 years ago as a research chemist. He became a vice president of Shell Chemical in 1942.

J. L. Ashworth, formerly district superintendent for Standard Oil Co. (Ind.) products pipeline department at Rensselaer, Ind., has been transferred to Moorhead, Minn.

Herman A. Metzger has been elected a director and vice president of Creole Petroleum Corp. in charge of the New York office. Metzger, who joined International Petroleum Co. in 1921, has seen extensive service in South America.

Ernest B. Miller, Jr., who recently was appointed general manager of Tide Water Associated Oil Co.'s southern division, has been appointed a vice president of the company. Miller joined the company in 1934 as a roustabout and after various promotions was named chief petroleum engineer of the Tide Water Mid-Continent division in 1947.

DEATHS

Charles R. Crane, II, vice president and director of Crane Co., died suddenly May 8 at his home in Chicago. He was 61 years old. A grandson of the founder of Crane Co., he was associated with the company 46 years and at his death was vice president in charge of European operations.

Gerald C. Dodge, 50, an assistant divisional manager for The Texas Co., died recently in an Indianapolis hospital.

William R. Cummings, district engineer for the U. S. Geological Survey, died in Holdenville, Okla., recently following a lengthy illness. Cummings had been with the survey for more than 25 years and had served in both Muskogee and Tulsa.

Joseph S. Rose, independent oil man, died recently in a Denver hospital following a heart attack. He had been active in the oil business for more than 30 years and moved to the Rocky Mountain area in 1950.

George H. Stevens, 60, former refinery superintendent of the Danciger Oil & Refining Co. at Danciger, Tex., died recently in Fayetteville, Ark. Stevens retired in 1950 because of ill health after 17 years of service with Danciger.

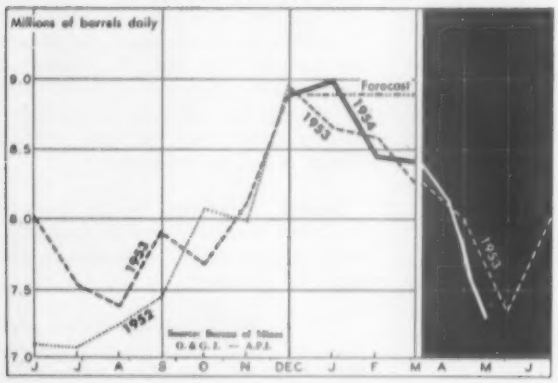
Jay C. Perrin, 60, president and founder of the Towlsaver Co., died in Los Angeles following a long illness.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,425,750	DOWN	1,250	UP	95,000
Crude stocks	273,003,000	DOWN	1,000,000	DOWN	5,182,000
Completions	1,062	UP	57	UP	93
Refinery runs	7,020,000	UP	209,000	UP	136,000
Gasoline stocks	175,750,000	DOWN	124,000	UP	21,751,000
Four-product stocks	307,867,000	UP	3,176,000	UP	28,064,000
Total imports	829,700	DOWN	240,700	DOWN	247,200

TOTAL DEMAND—ALL OILS



Heating-Oil Sale Plans Shift From Discounts to Price Protection

PRIMARY suppliers will be pushing summer sales of heating oils this year more than in the past, but current reports indicate that the emphasis will be shifted from summer discounts to price protection.

Esso Standard Oil Co. and Gulf Oil Corp. have announced promotion plans designed to get consumers and jobbers to fill heating-oil storage during the summer months. The two plans are very similar.

Esso's plan gives protection both to the consumer and to the reseller. The plan went into effect on May 17 and protects all household accounts, buying at the tank-wagon level, against any price drops in Esso's tank-wagon postings until the end of September. Customers with established credit ratings will be billed on October 1. Thus, there is no reason for the consumer to delay the purchase of his first tank of oil for next winter.

Protection vs. discounts . . . For the past few years, summer-fill discounts have been stressed even when contracts did guarantee some price protection. The fact that discounts were offered tended to leave the impression that the market was generally weak and that prices probably would be lower before the end of the summer. Many waited until the last 2 weeks of the discount period to fill their tanks.

Resellers under the Esso plan will be billed at the lowest price in effect between the delivery date of the oil and the end of September. The reseller who waits until the end of August to fill surplus storage tanks could be caught with a price increase before deliveries are completed.

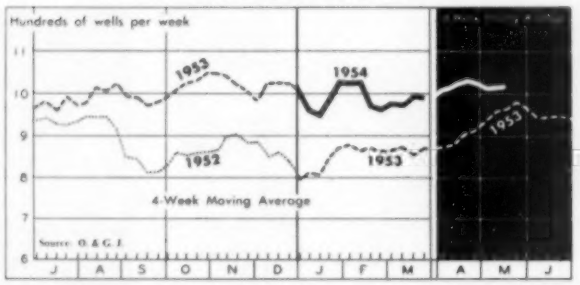
Soft markets . . . Another reason for more stress on price protection rather than summer discounts is the low level of the current market. Kerosine and home-heating distillate fuels are selling at prices that are as low as or even lower than at this time last year despite the increase in crude prices last June. The Gulf Coast lows are the same as last year, and prices for barge deliveries in New York Harbor are actually less than at this time last year. Group 3 prices are down slightly.

Primary inventories of kerosine and distillate in District 2 account for all of the small gain in heating-oil stocks over last year. Secondary distillate stocks may be less than a year ago.

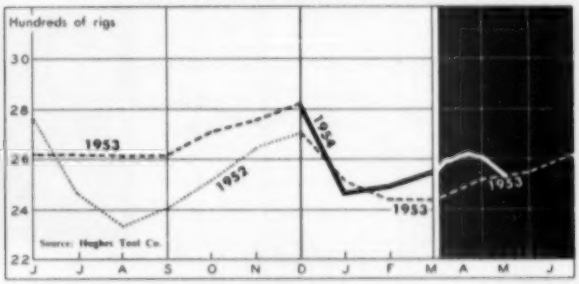
Crude price change . . . Tide Water Associated Oil Co. discontinued purchases of Pennsylvania Grade crude from Allegany field at the first of May and reduced postings for Bradford crude to $3.00 per barrel from $3.76, effective May 17. Sinclair Refining Co. is reported to have met the Bradford posting. Other area price changes are expected.

The average of reported inventories of Pennsylvania Grade crude for the 4-week period ended May 8 was 3,043,000 bbl. or 21 per cent greater than for the same weeks last year.

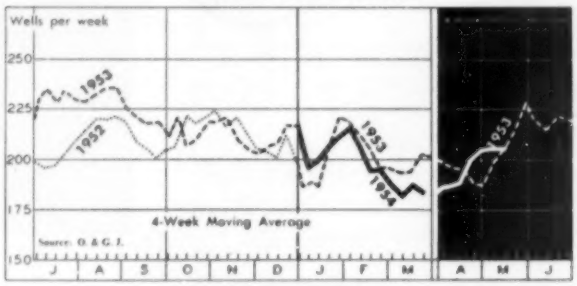
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

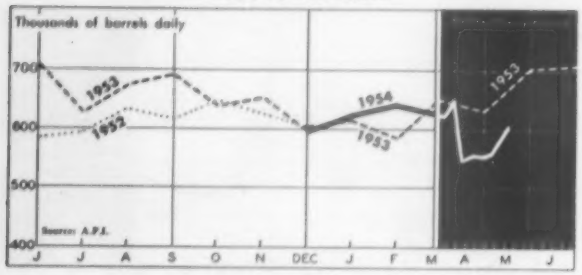
Area—	5-17-54	Change from 5-10-54	Change from 5-18-53
Gulf Coast	563	2	—61
N. and W. Texas-New Mexico	767	—46	—40
Arkansas-N. Louisiana-E. Texas	169	— 4	44
Oklahoma	315	—37	— 4
Kansas-S. Nebraska	164		—14
Illinois-Eastern	142	12	19
Rocky Mountain	252	4	29
Pacific Coast	146	4	—21
Total United States	2,518	—65	—48
Western Canada	112		—21

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 15, 1954

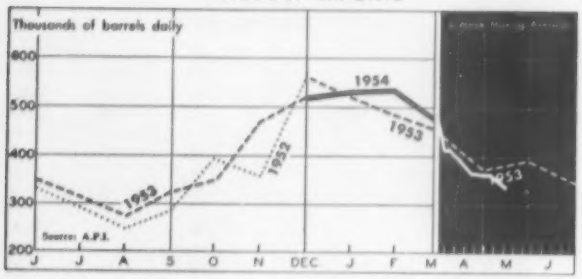
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	0	0	0	0	0	42	50	0	0	0	0	0	2	0	1	35	38
Arkansas	10	5	1	4	43,140	254	174	1	0	1	1	3	12	0	3	38	53
California	50	41	0	9	187,181	924	963	0	0	0	6	6	29	1	6	191	227
Colorado	37	23	5	9	197,589	472	185	0	0	0	6	6	13	0	0	165	178
Illinois	61	32	0	29	155,094	1,001	619	0	0	0	8	8	2	0	0	162	164
Indiana	20	5	0	15	32,851	293	434	0	0	0	4	4	4	0	0	68	72
Kansas	108	67	10	*31	369,456	1,669	1,848	3	0	0	11	14	30	0	7	216	253
Kentucky	19	7	0	12	33,556	401	383	0	0	0	4	4	8	0	0	44	52
Louisiana	66	50	0	16	466,588	1,213	959	3	0	1	9	13	39	20	13	101	173
North	28	23	0	5	82,604	654	392	0	0	1	3	4	5	0	4	38	47
South	38	27	0	11	383,984	559	567	3	0	0	6	9	34	20	9	63	126
Michigan	8	8	0	0	20,523	204	195	3	0	0	0	3	7	0	0	84	91
Mississippi	9	6	0	3	67,867	144	130	1	0	0	1	2	3	0	0	50	53
Montana	5	2	0	3	23,904	106	139	0	0	0	2	2	1	0	0	30	31
Nebraska	5	0	0	5	27,381	123	109	0	0	0	5	5	8	0	0	40	48
New Mexico	16	8	4	4	84,964	406	501	0	0	1	2	3	7	0	4	52	63
North Dakota	1	0	0	1	3,044	86	94	0	0	0	1	1	3	0	0	30	33
Ohio	28	13	3	†12	56,483	420	371	0	0	0	0	0	1	0	2	5	8
Oklahoma	159	102	3	†54	581,088	3,478	2,643	2	0	0	16	18	45	2	9	235	291
Pennsylvania-New York	48	24	4	‡20	83,700	903	865	0	0	0	0	0	0	0	3	10	13
Texas	387	202	11	174	1,706,370	6,703	6,376	8	1	1	104	114	258	28	60	1,539	1,885
Southwest (1 & 4)	41	22	3	16	197,735	958	1,027	1	0	1	13	15	27	16	15	267	325
Gulf Coast (2 & 3)	43	20	4	19	288,623	1,012	958	1	0	0	11	12	28	9	16	249	302
East (5 & 6)	22	9	0	13	133,560	333	311	1	0	0	4	5	7	0	6	89	102
North Central (7-B & 9)	168	76	0	92	517,955	2,529	2,362	3	0	0	52	55	124	2	8	637	771
West (7-C & 8)	92	62	0	30	493,561	1,528	1,393	2	0	0	20	22	72	0	10	267	349
Panhandle (10)	21	13	4	4	74,936	343	325	0	1	0	4	5	0	1	5	30	36
Utah	0	0	0	0	0	22	28	0	0	0	0	0	2	0	0	13	15
West Virginia	4	0	3	1	11,269	199	211	0	0	0	0	0	0	0	10	5	15
Wyoming	21	18	0	3	98,644	542	222	2	0	0	1	3	20	0	3	69	92
Miscellaneous	0	0	0	0	0	76	20	0	0	0	0	0	1	0	0	10	11
Total United States	**1,062**	613	44	405	4,250,692	19,681	17,519	23	1	4	181	**209**	495	51	121	3,192	3,859
Total previous week	1,005	568	59	378	3,960,396			23	0	8	170	201	472	50	117	3,011	3,650
Total May 16, 1953	969	482	97	390	3,948,913			27	0	9	196	232	506	34	142	3,234	3,916

Services wells included: *2, †4, ‡18.

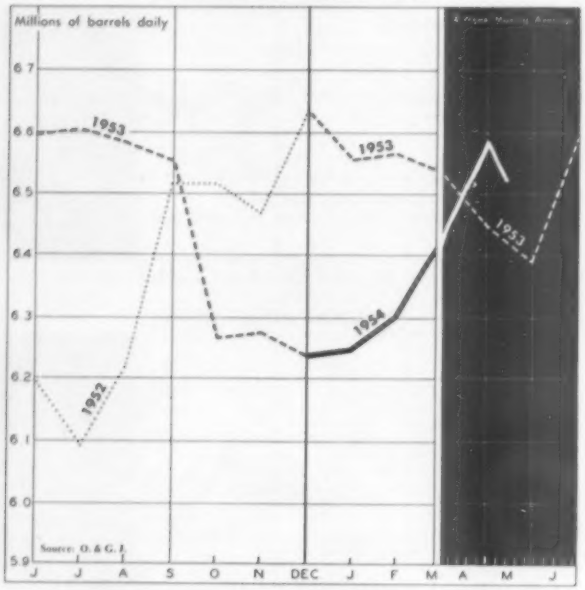
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

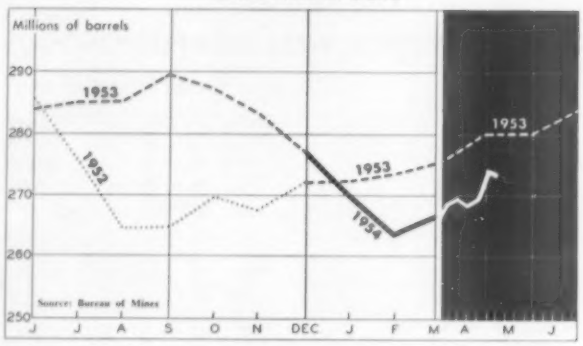


DAILY AVERAGE PRODUCTION FOR WEEK

	May 15 — Crude oil	May 15 — Lease condensate	May 15 — Total	May 8 total
Alabama	4,800		4,800	4,700
Arkansas	76,850	600	77,450	77,100
California	989,700		989,700	989,700
Colorado	124,000		124,000	125,200
Eastern	54,500		54,500	54,500
Florida	1,650		1,650	1,650
Illinois	183,600		183,600	187,000
Indiana	31,100		31,100	31,700
Kansas	328,600		328,600	321,500
Kentucky	36,200		36,200	35,700
Louisiana	668,450	44,250	712,700	712,950
North	108,450	3,750	112,200	112,450
South	560,000	40,500	600,500	600,500
Michigan	36,000		36,000	36,200
Mississippi	88,800	3,500	92,300	92,050
Montana	33,200		33,200	32,100
Nebraska	20,400		20,400	20,400
New Mexico	204,200	1,600	205,800	205,700
North Dakota	14,400		14,400	14,700
Oklahoma	536,100		536,100	541,400
Texas	2,640,000	50,550	2,690,550	2,690,550
Dist. 1	41,500	425	41,925	41,925
Dist. 2	139,000	7,200	146,200	146,200
Dist. 3	416,000	24,250	440,250	440,250
Dist. 4	240,000	6,000	246,000	246,000
Dist. 5	44,000	450	44,450	44,450
Dist. 6	109,000	5,200	114,200	114,200
East Texas field	229,500		229,500	229,500
Dist. 7-B	119,000	50	119,050	119,050
Dist. 7-C	178,000	4,750	182,750	182,750
Dist. 8	856,000	1,700	857,700	857,700
Dist. 9	188,000	500	188,500	188,500
Dist. 10	80,000	25	80,025	80,025
Utah	5,400		5,400	5,400
Wyoming	247,300		247,300	246,800
Total U. S.	6,325,250	100,500	**6,425,750**	6,427,000
Change from previous week, down			**1,250**	
Canada	143,850		143,850	168,700
Total U. S. production January 1-May 15			867,366,000 bbl.	
Same period last year (crude plus cond.)			*878,455,700 bbl.	

*Includes 12,654,000 bbl. condensate.

CRUDE-OIL STOCKS



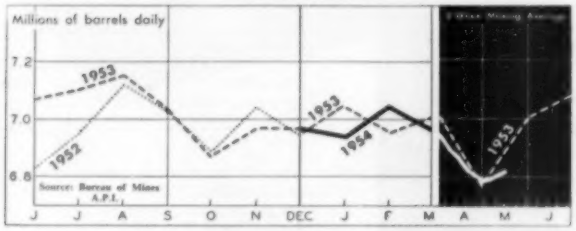
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

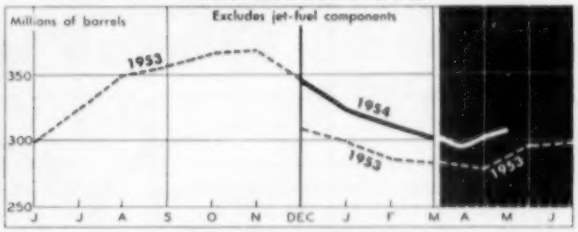
	May 8, '54	May 1, '54	May 9, '53
Pennsylvania Grade	3,030	3,150	2,550
Other Appalachian	1,989	1,829	2,206
Illinois, Indiana, Michigan	12,302	12,455	11,891
Kansas	9,625	9,781	10,881
Oklahoma	27,466	27,004	27,556
Arkansas	3,204	3,555	2,914
Louisiana	16,238	16,336	16,037
North	2,479	2,506	2,958
Gulf	13,759	13,830	13,079
Mississippi	3,314	3,287	4,192
New Mexico	7,192	7,598	7,385
Texas	125,709	126,645	134,562
East Texas proper	11,672	11,677	11,185
West Texas	54,677	54,512	63,467
Texas Gulf	26,676	26,460	25,870
Other Texas	32,684	33,996	34,040
Wyoming	13,978	14,229	13,123
Other Rocky Mountain	3,854	3,777	3,194
California	33,789	33,898	32,349
Foreign	†11,313	10,459	9,345
Total	273,003	274,003	278,185

*Bureau of Mines. †Includes 2,367,000 bbl. in California.

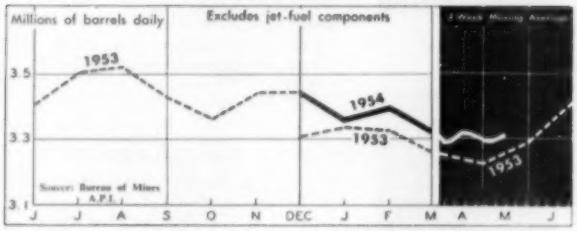
REFINERY RUNS



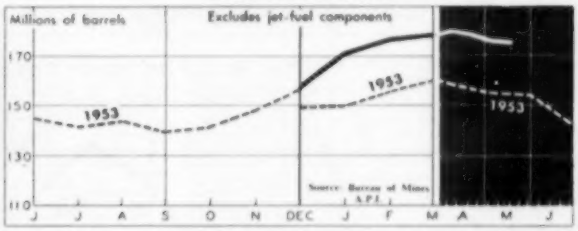
FOUR-PRODUCT STOCKS



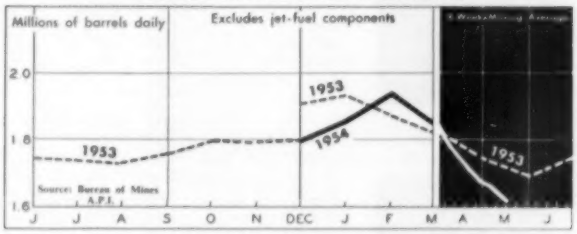
GASOLINE PRODUCTION



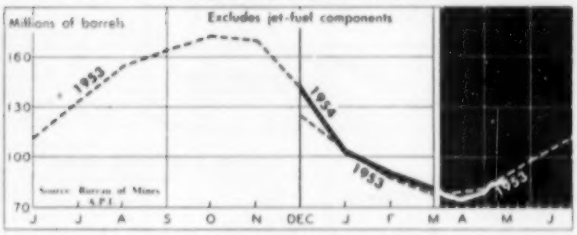
GASOLINE STOCKS



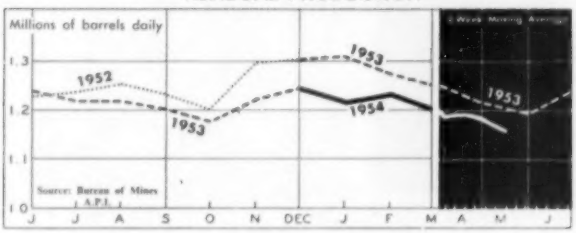
MIDDLE-DISTILLATE PRODUCTION



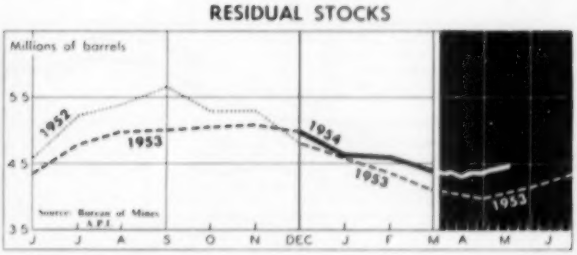
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, MAY 15

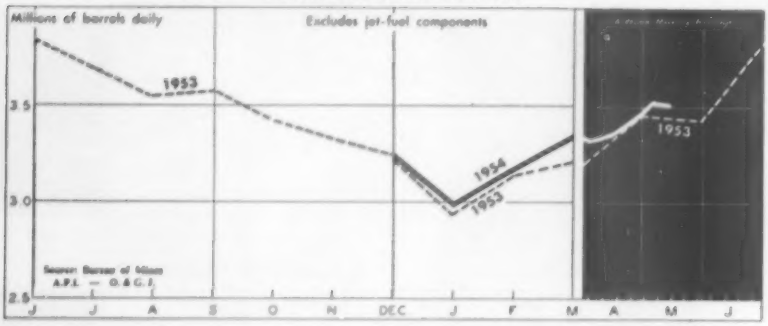
(Excludes all jet-fuel components)

(Thousands of barrels)

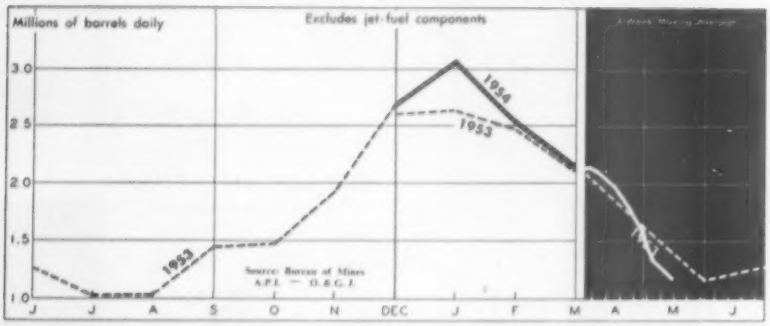
District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, May 1953—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,006	391.0	32.9	208.7	197.1	36,545	8,606	21,526	8,914	1,039	413.9	35.6	279.5	223.1
Appalachian:														
District 1	107	47.4	2.4	23.3	9.9	4,418	442	1,196	533	103	39.7	4.9	16.2	14.0
District 2	86	47.0	5.7	11.3	11.9	2,661	358	686	386	95	48.2	3.0	11.3	14.3
Ind., Ill., Ky.	1,317	675.4	69.3	229.0	175.8	39,138	4,502	10,901	4,277	1,229	630.6	68.5	199.1	156.1
Okla., Kans., Mo.	636	356.7	12.2	126.6	40.4	19,011	1,259	7,470	1,277	571	309.1	15.4	128.1	48.9
Inland Texas	253	184.6	12.0	42.2	26.6	7,099	356	1,317	1,378	263	169.5	15.4	41.9	34.4
Texas Gulf Coast	1,680	810.4	86.4	287.7	230.6	23,469	2,861	6,505	4,393	1,707	799.3	100.4	390.2	241.3
La. Gulf Coast	540	289.2	47.0	130.7	44.9	8,795	2,076	3,187	967	570	270.1	42.2	133.3	52.8
N. La. and Ark.	89	40.4	8.1	20.7	7.7	3,962	628	877	214	86	32.1	7.9	18.5	7.2
Rocky Mountain:														
New Mexico	20	11.3	1.0	3.0	2.7	193		60	45	17	10.9	0.5	2.1	3.4
Other Rocky Mtn.	241	117.9	3.3	47.9	36.6	8,271	151	1,893	886	238	111.8	3.9	52.4	42.3
California	1,045	464.4	8.1	147.9	378.1	22,188	351	9,913	21,726	1,084	461.6	5.8	154.6	359.6
May 15, 1954	7,020	3,435.7	288.4	1,279.0	1,162.3	175,750	21,590	65,531	44,996	7,002	3,296.8	303.5	1,387.2	1,197.4
May 8, 1954	§6,811	3,237.1	267.4	1,365.3	1,145.0	175,874	20,210	63,939	44,668					
May 16, 1953	6,884	3,211.0	348.9	1,308.0	1,238.0	153,999	20,864	64,682	40,258					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines. §Revised.

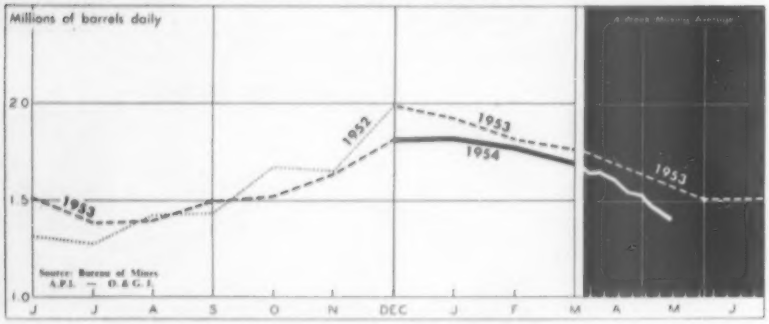
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leasing suppliers as of May 19, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.5-12.25	10.25-10.5
Premium gasoline	11.75-12	13.25-14	11.5-12.25
42-44 w.w. kerosine	9.125-9.25	9.95	8
No. 2 straw fuel oil	8.125-8.25	8.95	9
No. 6 residual	$1.00-1.20	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Tide Water Associated Oil Co. discontinued purchases of Pennsylvania Grade crude in the Allegany area and reduced postings for Bradford crude to $3.00 a barrel. Sinclair Refining Co. has met the Bradford posting, and other changes are expected.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 5-15-54	3,307	3,515
February 1954	3,365	3,182
January 1954	3,354	2,985
May 1953	3,297	3,456
Middle distillate:		
Four weeks ended 5-15-54	1,616	1,187
February 1954	1,957	2,417
January 1954	1,857	3,076
May 1953	1,691	1,171
Residual fuel:		
Four weeks ended 5-15-54	1,158	1,405
February 1954	1,241	1,753
January 1954	1,271	1,831
May 1953	1,197	1,510

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices east of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective May 20, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.00-3.26
Middle District	3.20
Southwest Pennsylvania	2.81
West Virginia	2.75
Ohio	2.74
Illinois Basin	3.02

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 20c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$14.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

PIPE. New seamless J55 mill end 5½" and 7" from Pueblo mill. Get our low prices. Pressey & Son, Pueblo, Colorado.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE—At our Arkansas City, Kansas, gasoline plant, 11—10' x 40' horiz. gasoline storage tanks, $850.00 each. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

FOR SALE: One 180-trace set of reflection seismograph instruments, rack and panel mounted. Very reasonably priced. Texas Seismograph Company, Box 2069, Phone 3-1493, Wichita Falls, Texas.

CARDWELL MODEL S single drum works with WAKU Waukesha, American brake-out cathead, LeBus grooved bar, good condition. $5500. W. C. Fatjo. Phone 5-6137, Lafayette, Louisiana.

BUCYRES-ERIE 22W spudder, trailer-mounted—49 Chevrolet truck—drilling line—sand line—bits—bailers—wrenches complete. All A-1 condition. Thomas Whelan, 712 West 2nd St., Odessa, Texas.

FOR SALE: Model "K" Cardwell single drum well servicing unit, powered by 6-SRK Waukesha. With single pole telescoping mast, tubing line, 2", 2½" and 3" tubing tools mounted on Ford tandem truck; ½ ton Studebaker service pickup. Good running condition. For details, call or write Melco Drilling Company, Phone 2333, Box 1360, Seminole, Oklahoma.

FOR SALE: At our Oklahoma City warehouse, a quantity of 9" OD 40# used J-55 seamless steel casing, 8V thd. ST&C, unshopped $2.50 per ft., shopped $3.00 per ft. Also 9" OD 46.10# LT&C ditto shopped $3.60 per ft. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 133—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

10" ELECTRICWELD LINE PIPE

10,000'—10¾" O.D. 40.48# Grade B Electricweld, Machine Cleaned, Straight, 40' DRL, ends beveled. Excellent like new condition, priced low, prompt shipment, Labadie, Missouri.

MID-STATES PIPE & SUPPLY CO.
Box 2534 Phone 2-9128 Tulsa, Okla.

FOR SALE EQUIPMENT

MODEL H CARDWELL Servicing Unit. Truck mounted with mast. Fully equipped. Box No. 1 or Phone 153, Canton, Kansas.

FRANKS ETS-500—Single Drum Hoist Less Engine. Sales Price—$1,500. General Appearance—Good. Unit complete with Franks Power Take-Off; Mounted on Steel and Wood Truck Bed. Location of Unit—Winfield, Kansas. Contact Cardwell, Wichita.

FRANKS MODEL 5000 Spudder—Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 65' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit—Western Kansas. Contact Cardwell, Wichita.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two LI-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

FOR SALE: ENGINE—165 Hp Climax T-61 on Skid. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C.; 2 unused, 1 slightly used. 11—Sperry 18" x 18" cast iron Filter Presses, 11 chambers. Consolidated Products Co. Inc., #65 Garden Street, Hoboken, N. J. N.Y. Tel.: BArclay 7-0600.

FOR SALE: 1951 Cessna 195; 245 HP; 400 total hours; Cross-wind Gear; VHF; OMNI; Gyros; Hangered; Brand new condition; one owner; $6,500; write Box H-201, The Oil and Gas Journal, Tulsa, Oklahoma.

SPECIAL LIQUIDATION

TOWERS AND COLUMNS

1—8' O.D. x 61' 6" SS, 15 trays, 50#, 300° F.
1—7' 6" O.D. x 55' 6" steel, 30 trays 45#, 300° F.
1—7' I.D. x 42' steel, 20 trays 40#, 150° F.
1—7' I.D. x 25'6" 10 trays, 50#, 250° F.
1—7' O.D. x 5' O.D. x 70' 4½" steel, 35 trays, 64#, 300° F.
1—6' I.D. x 64' steel, 35 trays, 55#, 300° F.
1—6' I.D. x 45' SS, 15 trays, 850#, 350° F.
1—5' O.D. x 61' 6" steel, 15 trays, 55#, 300° F.
1—4' O.D. x 110' 6" SS, 70 trays, 75#, 300° F.
1—4' O.D. x 72' SS, 40 trays, 55#, 300° F.
1—3' 6" I.D. x 63' steel, 35 trays, 55# 250° F.
1—2' 6" I.D. x 60' steel, 35 trays, 55# 300° F.
1—2' O.D. x 75' steel, 45 trays, 55#, 300° F.
1—2' I.D. x 71' steel, 50 trays, 70#, 300° F.

HEAT EXCHANGERS-CONDENSERS

2—1440 sq. ft. 304 S.S., 75# PSIG, 350° F.
5—1345 sq. ft. steel, 70# PSIG, 300° F.
1—1270 sq. ft. steel, 55# PSIG, 350° F.
2—1250 sq. ft. steel, 45# PSIG, 350° F.
2—1125 sq. ft. steel, 850# PSIG, 900° F.
2—1125 sq. ft. 304 S.S., 55# PSIG, 450° F.
1—750 sq. ft. steel, 60# PSIG, 350° F.
1—660 sq. ft. steel, 55# PSIG, 350° F.
1—400 sq. ft. 304 S.S., 75# PSIG, 350° F.
1—340 sq. ft. steel, 55# PSIG, 185° F.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, Justin 6032

FOR SALE EQUIPMENT

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg-McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others—Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

FAILING MODEL 1500 heavy duty drill. Write P. O. Box 819, Longmont, Colorado, for details.

STAR #47 standard cable tool rig. White engine, detachable Caterpiliar treads. Drilling and sand lines, assorted tools and bits. 4000 foot depth capacity. Located Elko, Nevada region, $6500 complete. Jeffrey Hunter, 12056 Laurel Terrace, Studio City, Calif.

FOR SALE: Wilson Titan—20" Gardner-Denver pump, 14" Gardner-Denver pump, 300-ton derrick equipment, Cameron Blowout preventer, 10,500' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-202, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: New Wilson Giant—127' Mast, 18" Oil Well pump, Cameron Blowout preventer, 9,000' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-203, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING equipment. New and used spudders, rotaries, tools. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

FOR SALE at Reduced Prices: 3 Happy Coolers for 25, 30, and 50 H.P. engines. Joe A. Huitt, Deep Rock Oil Corporation, Tulsa.

WANT EQUIPMENT: Did you find in equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

FOR SALE

55,000 MCF GASOLINE PLANT COMPLETE

Will sell as is, or break-up to suit buyer. If interestd a partial equipment list may be obtained by writing or calling Harry Hobbs—826 Johnson Bldg., Telephone No. 4-4404, Shreveport, Louisiana.

EQUIPMENT WANTED

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED: Duplex Power Driven Pump Capacity Approximately 40 G.P.M. between 2,000 and 3,000 pounds. METALCO INC., 1422 Euclid Avenue, Cleveland, Ohio.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

MATERIAL WANTED

One 12⅜" Shaffer Blowout Preventer, Type 39. One 10¾" Shaffer Blowout Preventer, Type 39.

MAKIN DRILLING COMPANY
P.O. Box 1628
Hobbs, New Mexico

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PETROLEUM ENGINEER

Core Evaluation
Foreign Employment

For work in petroleum laboratory supervising technicians engaged in determining porosities, permeabilities and fluid saturation on core material from Arabian reservoirs. Personal performance of special core work involving very high and very low range permeability determinations by liquids and gases, core resistivity work, capillary pressure determination and possibly relative permeability and water flood studies.

Degree in chemical engineering, physics, or basic engineering with specific experience in core analysis and evaluation required.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor
Box 32
Arabian American Oil Company
505 Park Avenue
New York 22, N. Y.

MECHANICAL ENGINEER

For Sales and Service
Beaird—Ingersoll-Rand
Packaged Gas Compressor Plants.
Salary and commission plus many employee benefits

THE J. B. BEAIRD COMPANY, INC.
P. O. Box 1115, Shreveport, La.

HELP WANTED

ENGINEER with experience in field of corrosion to set up and maintain corrosion control program on Gulf Coast off-shore installations for major oil company. Location in Mid-Continent Region. Salary commensurate with experience. Please summarize educational and experience background in first letter. Box H-185, The Oil and Gas Journal, Tulsa, Oklahoma.

THE SUPERIOR OIL COMPANY has an opening in the Geophysical Department, starting as a computer. College degree in Geology, Geological or Petroleum Engineering required plus math through calculus and basic physics. No experience required. Send transcript, photo and letter of application to Personnel Department, The Superior Oil Company, Midland, Texas.

OIL INDUSTRY Employment Service. Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

FIELD SUPERINTENDENT: Successful independent producer has opening for Central Kansas district requiring supervision of 1,000 barrel daily production and substantial drilling. Promising future. State age and qualifications. Strictly confidential. P. O. Box 1160, Tulsa, Oklahoma.

FOR A BETTER-PAID JOB

Production and Reservoir Engineers, Geologists, Draftsmen; Geophysicists, Party Chiefs, Computers and Field Crew Staff. WRITE US—STRICTEST CONFIDENCE.

GOOD EMPLOYMENT AGENCY
1554 California, Denver, AC 0835

PETROLEUM OR RESERVOIR ENGINEER

With minimum 3 years experience in development, production and oil and gas reservoir engineering on primary and secondary recovery problems. For New York office of major foreign producer.

MICROPALEONTOLOGIST

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in New York research laboratory. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned.

Salary for above positions dependent on experience and qualifications. Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OGJ-11
Arabian American Oil Company
505 Park Avenue
New York 22, N. Y.

HELP WANTED

REFINERY PROCESS ENGINEER
Excellent future in Midwest refinery. Age 25-35 with BS degree in chemical or petroleum engineering. Must be thoroughly familiar with modern refinery processes. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY OPERATING SUPERVISOR
Modern Midwest refinery undergoing extensive refinery expansion, desires man to assist in supervising fluid cat-cracking polymerization and topping operations. Must have at least five years' experience and college degree. Box H-208, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER
Upper Midwest refinery has excellent opportunity for young man. Must have several years' experience in refinery operations or engineering and have degree in chemical or mechanical engineering. Write Box H-206, The Oil and Gas Journal, Tulsa, Oklahoma.

OLD ESTABLISHED DISTRIBUTOR of oil well supplies and oil well pumping equipment has opening for experienced sales engineer, age 35-45. The man who can qualify and has good contacts with the producing division of the oil industry can expect bright future and unusual earnings. References and complete information, which will be kept strictly confidential, must accompany application. Box H-200, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT. Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

PETROLEUM ENGINEER: 3½ years field engineer drilling and production Texas and Louisiana. Opportunity only consideration. Box H-195, The Oil and Gas Journal, Tulsa, Oklahoma.

EMPLOYED GEOLOGIST — 32, married, four and one-half years experience with major oil company. Desires position with medium to small company or independent in Rocky Mountain region. Experience includes seismic interpretation, surface, photo and subsurface geology and well sitting. Good references. Box H-214, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 28, M.S. degree, 1 year field and 2½ years Gulf Coast Multi-Zone reservoir experience. Schlumberger electric log school. Reserves, exploitation, pressure-maintenance and water-drive studies. Desires Houston, Dallas, or Tulsa location. Resume on request, presently employed. Box H-169, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 35, married, 7½ years experience in West Texas with major company in drilling, production, remedial, and gas injection projects. Licensed Professional Engineer. Desire responsible position with independent as either production supervisor or engineer. Box H-211, The Oil and Gas Journal, Tulsa, Oklahoma.

TO THE INDEPENDENT OIL (GAS?) OPERATOR

Have your gas sales grown to a point where they need supervision? If so, I would like to discuss the managing of your program. Graduate engineer, 11 years gas experience. All services of a major oil company gas dept. available. Contract or retainer basis. Reply to **GAS DEPT., BOX 1572, MIDLAND, TEX.**

EXPERIENCED PRODUCTION AND DRILLING MANAGER

Presently employed by major oil company. Wishes to work for independent operator for reasonable salary and carried interest. Graduate Petroleum Engineer, 10 years management and field experience in drilling, production, and secondary recovery in Texas, New Mexico, Oklahoma, Louisiana, and Mississippi. Proration work all states. Married. Excellent recommendations, age 35. Salary less important than opportunity offered. Write Petroleum Engineer, P.O. Box 2035, Dallas, Texas.

SITUATIONS WANTED

PETROLEUM AND NATURAL GAS ENGINEER with many years of experience in making reports, appraisals, and tax studies for commercial, public utility, and income tax purposes, desires change in permanent position. Can furnish best of reference. Box H-198, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD SUPERINTENDENT or GENERAL MANAGER: B.S. degree, ten years varied experience in drilling and production. Presently employed as manager of consulting engineering and well operating company. Box H-197, The Oil and Gas Journal, Tulsa, Oklahoma.

PROFESSIONAL Engineer, over 20 years experience in all phases of the oil and gas business. Desires a change if the right connection can be made. Box H-192, The Oil and Gas Journal, Tulsa, Oklahoma.

B.S. IN CH. ENG. 1943, age 32, married, experience, 4 years in control laboratory, 7 years long range programing and economics of refinery operations, all with major oil companies in Latin America. Desire return to U. S. Box H-193, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF PETROLEUM ENGINEER: Major company, South America. Production geology and petroleum engineering background, B.S., 37. Have handled important technical and administrative duties for many years. Want job with sound, efficiently managed company, U.S.A. or Canada. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

OFFERING: Unusual background combining thorough practical and technical knowledge all phases drilling, production, pipeline plus executive ability to manage personnel, conduct top-level negotiations, write, talk effectively. Age 46. Graduate leading engineering school. 25 years' experience. Know New York, Washington, Mid-Continent, Texas, Gulf and Pacific Coasts. Present location, Houston. Foreign or domestic considered. Box H-204, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company. Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

WYOMING OIL GEOLOGIST, 14 years' comprehensive exploratory background, 9 years in Rockies, wants full or part time position in Casper. Box H-199, The Oil and Gas Journal, Tulsa, Oklahoma.

PRESENTLY EMPLOYED graduate geologist, experienced map compiler, and photo interpreter desires employment in photo geology or sales with major oil company. Box H-210, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P.O. Box 487, Wilmington, Delaware.

ROYALTIES

OIL ROYALTY
In Colorado's Hot Spot, Weld County; will sell up to 100 Ac. Personally owned minerals under Major Co.'s lease. Perpetual Particp. Also an attractive lease in their block. Guy J. Stumpff, Pet. Eng., Box 278, Aurora Br., Denver, Colo.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

SHALLOW OIL production with large acreage offered in Miami County, Kansas, suitable for primary and secondary recovery with very large potential. Information to interested parties on request. Box H-212, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL PROPERTIES
Bought—Sold—Financed—Developed
Inquiries Invited
AMERICAN OIL SCOUTS
Dept. OJ, 7321 Beverly Blvd., Los Angeles 36, Calif.

OIL MEN — INVESTORS
SOUTHWEST WYOMING
MAJOR STRUCTURE—parallel to important producing oil fields, to drill. Recommend leases or royalty on structure this important area. Complete technical data on request.
W. J. PETERMAN, Geologist
1918-1954
Portales **New Mexico**

AVAILABLE
Close in Leases
4000 ft. Arbuckle test. Salinas Basin. Structural condition indicates well location is well selected.
IVAN H. MOORE
Coffeyville, Kansas

PRODUCTION FOR SALE

OIL MAN MUST RETIRE from business and dispose of settled production averaging $25,000 per year. More wells should be drilled to fully develop the property. Engineering, geological reports, and other data will be submitted to principals only or authorized agent. Prompt reply necessary.

BOX H-213
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

OFFSET farmout, lease, drilling blocks available in several counties, shallow to deep production, also sulphur prospect. Particulars H. Priesmeyer, Garwood, Tex.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

FOR SALE: 320 acres plus ½ mineral, 8 miles south of Elk City. Box 7561, Lakeside Station, Oklahoma City 16, Okla.

160-ACRE lease Stephens County, Okla. for sale or development. 2 flowing wells high production on adjoining land. Address Box 572, Chickasha, Okla.

3000 ACRES. Northfield-Macedonia-Twinsburk townships, Summit County, Ohio. Want Trenton test, 4600'. Excellent geology. Small override. W. J. Smith, 3559 East Blvd., Cleveland 5, Ohio. Phone: Michigan 1-1736.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6835 Delmar Ave., St. Louis 5, Mo.

LOOKING NORTHWARD FOR BETTER OPPORTUNITIES?

Alberta offers larger blocks, better deals, exciting new producing horizons, new markets. Leases, reservations (20,000 to 100,000 acres), drilling deals and farmouts arranged by one of Alberta's most successful operators. Interested only in corresponding with substantial interests who are interested enough to inspect deals on the spot in Calgary.

Box H-205, The Oil and Gas Journal, Tulsa, Oklahoma

CAPITAL WANTED

NEED CAPITAL for developing Oklahoma leases. Major company will provide detailed geophysical data on areas involved. Reply: Box H-177, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

LEGAL

Sealed bids for Oil and Gas Mining Leases on restricted Tribal and Allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of the said reservation, New Town, North Dakota, until 2:00 P.M., Central Standard Time on June 1, 1954, and will be opened immediately thereafter in the presence of such bidders as may attend. There are 1,028.23 acres of Tribal lands and 24,423.40 acres of allotted lands for a grand total of 25,451.63 acres. All of this land is located in the counties of Mountrail, McLean, and Dunn, State of North Dakota. For additional information write the Superintendent of the Fort Berthold Agency, New Town, North Dakota, or call the Agency Land Office, phone 654, New Town. Ralph M. Shane, Superintendent.

OPPORTUNITIES CAPITAL

OPPORTUNITIES CAPITAL

OPPORTUNITY FOR CAPITAL

Reliable firm of Registered Professional Petroleum Engineers, with long and varied technical and practical experience in drilling, oil and gas property management and development, and secondary recovery operations, desires contact with substantial sources of capital interested in oil and gas prospects and properties.

Not interested in promotional ventures, but willing to exchange references and discuss terms with desirable and suitable clients.

Box H-187, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT MEN

Royal Bank Opens Two Oil-Field Branches

The Royal Bank of Canada has opened two new branches to serve the banking needs of the Pembina oil region in Alberta. One is located at Evansburg and the other at Drayton Valley. The Evansburg branch will be open on Monday, Wednesday, and Saturday, and the Drayton Valley branch on Tuesday and Thursday. Both branches are under the managership of W. H. Wood.

Vetter Takes New Post At Geophysical Service

E. O. Vetter has been appointed assistant vice president, administration, for Geophysical Service, Inc., the G.S.I. board of directors has announced. He will head a newly organized administrative division set up to coordinate G.S.I. staff functions and to consolidate activities of the company's control and equipment departments.

Vetter joined the staff of G.S.I. as controller in September 1952.

Argue is Engineering Manager, Stone & Webster

F. W. Argue has been named engineering manager of Stone & Webster Engineering Corp. with headquarters in Boston.

Argue, who will be in charge of engineering and design activities of Stone & Webster, joined the company in 1941. He was named assistant engineering manager in November 1952.

W. F. Ryan, vice president, has been named senior consulting engineer of the corporation and placed in charge of its engineering report and appraisal activities.

Unification of Pyrene, C-O-Two Nearly Complete

S. R. Baker, chairman of the board and president of Pyrene Manufacturing Co. and its wholly owned affiliate, C-O-Two Fire Equipment Co., has just announced that the unification of the two organizations is rapidly nearing completion with the election of the directors and officers to serve for both companies.

Directors are: S. R. Baker, Meyer Botwinik, M. A. Laswell, Harry Levine, Louis Levine, A. F. Ratzer, and Chester Rohrlich.

Officers in addition to Baker include: F. B. Allen, M. A. Laswell, Louis Levine, and A. F. Ratzer as vice presidents; Meyer Botwinik as treasurer; B. S. MacCabe as secretary; and J. R. Zelenka as assistant treasurer and assistant secretary.

L. E. Eckelmann is also a vice president of Pyrene, and R. F. Batch and C. S. Duncan are assistant secretaries of C-O-Two.

The unified companies have general offices and factories in Newark, N. J., and manufacture a complete line of fire protection equipment.

Harley Sales Expands Houston Branch Store

Harley Sales Co., Tulsa., oil-field distributor for Wisconsin heavy duty air-cooled engines and all types of utility units, has relocated its Houston store in enlarged quarters to provide greater customer and shop convenience and parking space, according to Roy O. Neal, president.

The new store building has a floor area of 6,000 sq. ft., most of which is devoted to a complete modern service and parts department. A full line of Wisconsin heavy duty air-cooled engines, ranging from 3 to 36 hp. will be maintained in the store.

George E. Kuppel, Jr., who established the original Harley office in Houston continues as manager, and Tom Gray, who has had considerable field experience in engine sales and service, has joined the Houston staff, according to Neal.

ADVERTISERS IN THIS ISSUE

Aero Design and Engineering Company 246, 247
Aetna Ball and Roller Bearing Company 40
Air Preheater Corporation, The 394
Air Reduction Magnolia Company 323
Aldrich Pump Co., The 360
Alexander Shipyard Inc. 310
Allis-Chalmers Mfg. Co. 41, 64, 65
Allis-Chalmers Mfg. Co. (Tractor Division) 109
Alten Foundry & Machine Works, Inc. 420
Aluminum Co. of America 314, 315
American Brass Co., The 359
American Car and Foundry Company 328
American Chain Division of American Chain & Cable 418
American Hoist & Derrick Co. 379
American Iron & Machine Works Co. 402
American-LaFrance-Foamite Corp. 364
American Manufacturing Co. of Texas 5
American Meter Company 393
Ampco Metal, Inc. 291
Ansul Chemical Co. 292, 293
Armstrong Bros. Tool Co. 275
Attapulgus Minerals & Chemicals Corporation 363
Autocar Company, The 313
Automatic Sprinkler Corporation of America 108
Avondale Marine Ways, Inc. 27
Axelson Manufacturing Company 13
Baash-Ross Tool Company 381
B and W Inc. 375
Babcock & Wilcox Company, Tubular Products Division, The 289
Baker Oil Tools, Inc. 116
Baker-Raulang Company, The 326
Bank of Toronto, The 229
Barco Manufacturing Company 302
Baroid Sales Division, National Lead Company 443, 444, 445, 446
Barrett Division of Allied Chemical & Dye Corp. 79
Bauer & Black Division of The Kendall Company 327
Beaumont Iron Works, A Subsidiary of American Locomotive Co. 266
Bendix Aviation Corporation 81
Bethlehem Supply Co. 196
Bi-Lateral Fire Hose Company 280
Blackmer Pump Company 237
Bonney Forge & Tool Works 300
Bos-co Equip't Eng'r'g & Mfg. 284
Bovaird Supply Co., The 26
Brewster Company, Inc., The 37, 38
Bristol Company, The 354
Broderick & Bascom Rope Co. Back Cover
Burgess-Manning Company 110
Cabot Shops, Inc. 396
Camco Products, Inc. 427
Cameron Iron Works, Inc. 89, 312
Cannon Electric Company 385
Carboloy Department of General Electric Company 244
Cardinal Chemical, Inc. 317
Cardwell Mfg. Co., Inc. 230, 231
Carter Company, Inc., S. C. 77
Catawissa Valve & Fittings Co. 112
Caterpillar Tractor Co. 11
Chapman Valve Mfg. Co., The 82
Chemicals & Materials Corp. 448
Chemical Construction Corporation 92
Chicago Pneumatic Tool Company 21
Cities Service Oil Co. 304
City National Bank of Houston, The 202
Classified Advertising 457, 458, 459, 460
Climax Engine and Pump Mfg. Co. 97
CF&I Tubular Products, The Colorado Fuel and Iron Corporation 39
Columbia-Southern Chemical Corporation 105
Columbian Steel Tank Co. 344
Communications Company, Inc. 303
Consolidated Engineering Corporation 67
Construction Machinery Companies 256
Continental Motors Corp. 336
Continental Supply Co., The 394
Cooper-Bessemer Corp., The 192
Cooper, Inc., Fred E. 262
Coppus Engineering Corp. 3
Core Laboratories, Inc. 113
C-O-Two Fire Equipment Company 332
Crane Co. 7

Crose Manufacturing Co., Inc., M. J. 376
Crucible Steel Company of America 367
Cummins Engine Co., Inc. 32, 33
Cutler-Hammer, Inc. 104

Darling Valve and Mfg. Co. 383
Dayton Rubber Co. 442
Dean Brothers Pumps, Inc. 430
De Laval Steam Turbine Co. 334
Delta C&S Air Lines 379
Delta Engineering Sales Co. 370
Deming Company, The 371
Denison Engineering Company, The 362
Detroit Diesel Engine Division, General Motors Corp. 101
Deublin Company 107
Distinguished Hotels 324
Dollinger Corporation 340
Dore', Co., John L. 448
Dow Chemical Company, The 45
Dowell Incorporated 224, 225
Dresser Industries, Inc. 390, 391
Drilling & Service, Inc. 447
Drilling Equipment Mfg. Co. 2
du Pont 303

Eastman Chemical Products, Inc. 89
Eaton Manufacturing Company, Axle Div. 54
Edward Valves, Inc. 283
Ellerbee Brothers 57
Emerol Manufacturing Company, Inc. 9
Empire Trust Company 12
Emsco Screen Pipe Company 241
Ensign Carburetor Company 305

Fairbanks, Morse & Co. 431
Farrel-Birmingham Co., Inc. 80
Federal Telephone and Radio Company 48
First National Bank in Dallas 301
First National Bank in Houston 296
Fleet-Line Co. 279
Flint Steel Corporation 395
Floridin Company 203
Fluor Corporation, Ltd., The 356
Ford Motor Company 76
Fort Worth National Bank, The 295
Fort Worth Steel & Machinery Co. 377
Foster Wheeler Corporation 53
Foxboro Company, The 66
Fuller Company 319
Fulton & Company, R. H. 272
Fyr-Fyter Co., The 236

Gardner-Denver Company 213
Garlock Packing Company, The 365
Gaso Pump & Burner Mfg. Co. 274
Gates Rubber Co., The 407
General Controls 438
General Electric Company 298, 299
General Electric Company, Carboloy Department 244
Glasscock Drilling Co., C. G. 232
Gott Mfg. Co., H. P. 294
Grancell, I. H. 283
Grant Oil Tool Co. 58
Gravely Tractors, Inc. 439
Graver Tank & Mfg. Co., Inc. 30
Griscom-Russell Co., The 93
Grove Regulator Co. 62
Guiberson Corporation 216
Gustin-Bacon Manufacturing Co. 204
Haering & Co., Inc., D. W. 226
Halliburton Oil Well Cementing Co. Inside Front Cover, 8
Hamer Oil Tool Company 385
Hammond Iron Works 10
Harbison-Fischer Mfg. Co. 403
Harnischfeger Corp. 388
Harrisburg Steel Corporation 244
Hawthorne, Inc., Herb J. 421
Hazard Wire Rope Division of American Chain & Cable Co., Inc. Inside Back Cover
Hercules Tool Company 427
Hewitt Rubber Division, Hewitt-Robbins, Incorporated 94, 95
Houston Contracting Company 291
Houston Ready-Cut House Co. 275
Hudson Engineering Corporation 409
Hughes Tool Co. Front Cover
Hyatt Bearings Division, General Motors Corp. 98
Ideco A Division of Dresser Equipment Co. 329
Independent Exploration Co. 386
Inferno Co., The 219
Ingersoll-Rand 75
Interstate Electronic Supply Corp. 284
Jensen Brothers Mfg. Co. 290
Jerguson Gage & Valve Co. 280
Jet-Lube Inc. 430
Johnston & Jennings Company, The, Division of Pettibone Mulliken Corporation 399
Johnston Testers, Inc. 72
Jones & Laughlin Steel Corporation Supply Division 259
Jones Company, The S. M. 426

Kellie Products, Inc. 376
Kelley Company, Ben F. 431
Kellogg Co., The M. W. 23, 73, 74, 321, 322
Kenyon & Sons, Ltd., William 255
Kerrigan Iron Works, Inc. 208
Kimray Inc. 214
Kinzbach Tool Co., Inc. 294
KLB Derricks 237
Klinger Limited, Richard 189
Koehring Company 14

Lambert Oil Exploration Co. 237
Lane-Wells Company 114
Larkin Packer Company, Inc. 424
Laughlin Company, The Thomas 370
Leland Equipment Co. 367
Le Roi Company 368, 369
Lone Star Cement Corporation 110
Lufkin Foundry & Machine Co. 49
Lunkenheimer Co., The 349

Magnet Cove Barium Corp. 437
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 320
Manning, Maxwell & Moore, Inc. 346, 347
Marlow Pumps Division of Bell & Gossett Company 416, 417
Martin-Decker Corp. 374
McCullough Tool Company 215
McKee & Co., Arthur G. 17
Mercoid Corp., The 250
Metals Disintegrating Company, Inc. 277
Mid-Continent Supply Company 325
Midwest Piping Company, Inc. 63
Minneapolis-Honeywell Regulator Co., Industrial Division 86, 87
Minnesota Mining & Mfg. Co. 335
Mission Mfg. Company 396, 397
Mixing Equipment Co., Inc. 249
Morse Chain Company 51

Nash Engineering Co. 68
National Airoil Burner Co., The 375
National Bank of Tulsa 50
National Supply Co., The 285, 286, 287, 288
National Tank Company 462
Naugatuck Chemical Division of United States Rubber Company 400
Newport News Shipbuilding and Dry Dock Company 91
Nordstrom Valve Division, Rockwell Manufacturing Company 46, 47
Norris Manufacturor, Inc., W. C. 200
Northwest Engineering Company 227

Oakite Products, Inc. 206
Ohio Injector Company 78
Oil and Gas Journal, The 279, 316, 433
Oil Center Tool Co. 42, 43
Oil Well Supply Co. 4
OPW Corporation 6
Orbit Valve Company 366
Oronite Chemical Company 348
Otis Pressure Control, Inc. 441

Pacific Car and Foundry Company 235
Pacific Pumps Inc. 428
Parco Company, The 284
Parker Appliance Company, The 350, 351
Parsons Company, Ralph M. 242
Peerless Mfg. Co. 71
Peerless Pump Division of Food Machinery & Chemical Corporation 281
Peerless Supply Co. Inc. 280
Pelton Water Wheel Co. 16
Penberthy Injector Co. 338
Pennsylvania Flexible Metallic Tubing Company, Inc. 353
Perforating Guns Atlas Corporation 414
Permian Basin Oil Show 430
Petro-Chem Development Co., Inc. 278
Petreco, A Division of Petrolite Corporation 352
Petroleum Distributing Co. 228
Petroleum Electric Power Assn. 31
Petty Geophysical Company 34
Philadelphia Gear Works, Inc. 361
Phoenix Manufacturing Company 241
Pittsburgh Coke & Chemical Co. 372, 373
Plastic and Rubber Products Co. 432
Porocel Corporation 363
Posey Iron Works, Inc. 85
Powell Valves 22
Powers Regulator Company, The 239
Previews Inc. 290
Procon Incorporated 358
Pure Oil Company, The 308

Radio Corporation of America 345
Ratigan, Inc., J. P. 284
Rector Well Equipment Co., Inc. 96
Reed Roller Bit Company 251, 252
Refinery Supply Co., The 232
Reilly Tar & Chemical Corp. 253
Reliance Electric and Engineering Co. 93
Republic National Bank of Dallas 98
Republic Steel Corporation 330, 331
Ridge Tool Company, The 423
Robbins & Myers, Inc. 248
Roebling's Sons Company, John A. 61
Rolo Manufacturing Co. 222
Roots-Connersville Blower A Division of Dresser Industries, Inc. 389
Rotary Engineering Company 296
Royal Bank of Canada, The 211

Sawyer & Son Co., The H. M. 261
Schlumberger Well Surveying Corp. 355
Schutte and Koerting Company 209
Security Engineering Division Dresser Operations, Inc. 392
Seismic Explorations, Inc. 29
Seismograph Service Corp. 413
Shaffer Tool Works 422
Shand & Jurs Co. 311
Sheffield Steel Corporation 103
Shell Development Company 318
Sherman Products, Inc. 228
Sherwin-Williams Co., The 408
Sims Pump Valve Co., Inc. 241
Smith Corporation, A. O., Meter Division 44
Smith Oil Tool Co., H. C. 282
Smith Welding Equipment Corporation 280
Southwestern Industrial Electronics Co. 429
Spicer Mfg., Div. of Dana Corp. 19, 20
Steel Forgings, Inc. 279
Stratoflex, Inc. 295
Superior Combustion Industries, Inc. 99

Technical Oil Tool Corporation 434
Templeton, Kenly & Co. 290
Texas Iron Works 333
Texsteam Corporation 111
Thermoid Company 341
Thompson Products, Inc. 406
Thompson Pump Company 294
Thompson Tank & Manufacturing Co., Inc. 296
Thompson Tool Co. 435
Tidelands Exploration Co. 390
Timken Roller Bearing Company 35
Torrington Company, The 106
Transcontinental Gas Pipe Line Corporation 15
Tretolite Company, A Division of Tretolite Corporation 52
Trippiehorn Co., The 268
Tube-Kote, Inc. 233
Tube Turns, Inc. 55, 56
Tulsa Winch Division of Vickers Incorporated 94
Turner Uni-Drive Company 384

Union Wire Rope Corporation 24, 25
United States Rubber Company, Naugatuck Chemical Division 400
U. S. Steel Corp. Subsidiaries 4
United Supply & Manufacturing Co. 254
Universal Atlas Cement Co. 410
Universal Oil Products Co. 404, 405

Valley Electric Corp. 388
Vapor Recovery Systems Company, The 268
Vickers Incorporated 36
Victaulic Co. of America 440
Vinson Supply Co. 100
Vogt Machine Co., Henry 102
Voss Co., Inc., J. H. H. 399

Walker Co., W. L. 302
Walker-Neer Manufacturing Company 220
Wallace & Tiernan Products, Inc. 304
Wall Colmonoy Corporation 276
Warner Lewis Company 395
Waukesha Motor Company 78
Waukesha Sales & Service, Inc. 70
Web Wilson Oil Tools 284, 337
Wedgeplug Valve Company, Inc. 309
Welex Jet Services Inc. 18
Well Equipment Mfg. Corp. 59
Westinghouse Electric Corp. 306, 307
Weyerhaeuser Timber Company 419
Wheatley Pumps & Valves, Frank 392
Wheland Company, The 60
White-Roth Machine Corp. 436
Williams Brothers 401
Wilson Products, Inc. 316
Wilson Foundry & Machine Co. 357
Wilson Manufacturing Co., Inc. 297
Wisconsin Motor Corporation 234
Wood's Sons Co., T. B. 448
Worthington Corporation 90, 342, 343

Yale Machine Works 425
York Co., Inc., Otto H. 267
Young Radiator Company 339
Youngstown Sheet and Tube Company 199

Zink Company, John 270

FLARE GAS
(RESERVOIR DOLLAR)
WASTE IS HELD TO THE MINIMUM WITH

National "LTX" Systems*

Heat in base of "LTX" Separator gives advantages NOT obtained by use of "LTG" (Low Temperature Glycol) Separator with no heat in base.

1. LTX means maximum high pressure gas sale, minimum low pressure gas waste, and maximum stock tank liquid recovery per unit volume of well effluent produced.
2. LTX means ability to operate without glycol injection.
3. LTX means ability to operate with glycol injection at minimum cost.
4. LTX means proven maximum trouble-free operation for all conditions and locations.

*T. M. Reg. U. S. Pat. Off.

It's National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

1-5-54

HOW?

—with HAZARD's Ton-Mile Plan

If you will put HAZARD'S TON-MILE PLAN into effect on your rigs, you'll surprise yourself when you see how much longer your drilling lines last. There's nothing complicated or mysterious about this plan, and once you start it, you'll realize how much you have paid in the past for service you didn't get.

HAZARD'S TON-MILE BOOK outlines the system you must follow. It tells how much line to string up. It tells you when to cut off and how much. The simplified ton-mile tables and safety factor charts are easy to understand and use. The service record sheets are 8½" x 11" with plenty of room for all entries. And the thick triple covers with spiral wire binding keep the book neat and clean for a long time.

See your HAZARD distributor at once. Let him give you the facts on LAY-SET Preformed drilling lines. Have him explain HAZARD'S TON-MILE PLAN, then put it into effect on your rigs. See how much longer your HAZARD lines last.

HAZARD WIRE ROPE DIVISION
American Chain & Cable Company, Inc.

PLANTS: Houston, Tex., Wilkes-Barre, Pa.
OFFICES AND WAREHOUSES: Odessa, Tex., San Francisco, Portland, Ore., Pittsburgh, Philadelphia, New York, Los Angeles, Denver, Chicago, Atlanta • Bridgeport, Conn.

35,000 FEET OF HOLE—

Yellow Strand® Wire Rope Puts Down 14 Wells For Ardee Oil Company

In the Geneva Pool of Henderson County, Kentucky, an Emsco GA-160 Rig is drilling a well for the Ardee Oil Company, of Henderson. The rig is equipped, from platform to crown block, with Broderick & Bascom Wire Rope. The drilling line is 1" 6 x 19 Preformed Yellow Strand and the tough rope has drilled 35,000 feet to put down 14 wells for Ardee.

This is the performance that is built into every foot of Yellow Strand. You can count on steady drilling, on uninterrupted work schedules, on profitable long-life with Yellow Strand, and on fast service from your Continental-Yellow Strand distributor.

Try Yellow Strand on your next order and prove to yourself that Yellow Strand can make more hole —more money!

SPECIFY . . .

Yellow Strand

FOR SAVINGS!
FOR SAFETY!
FOR SERVICE!

AND STILL GOING STRONG!

BRODERICK & BASCOM ROPE CO.

4203 Union Blvd., St. Louis 15, Mo.